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"Trans broken arm syndrome"

Examining causal antecedents of gender-related medical misattribution and invasive questioning in healthcare settings through the lens of person perception

A thesis submitted in partial fulfillment of the requirement of the degree of Master of Science at

Virginia Commonwealth University

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Abstract

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By: Catherine S. J. Wall, B.S.

A thesis submitted in partial fulfillment of the requirement of the degree of Master of Science at Virginia Commonwealth University

Virginia Commonwealth University, 2021

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August 2021

Transgender individuals face particular challenges when interacting with a cisgender focused medical system. Gender-related medical misattribution and invasive questioning (GRMMIQ), colloquially known by the tongue-in-cheek named "trans broken arm syndrome," is a form of medical discrimination wherein a healthcare provider assumes that a transgender patient's medical complaints, regardless of origin, result from their gender identity or medical transition. Previous research has suggested that this, and other forms of identity-related discrimination both in and outside of healthcare, might be understood either using a top-down approach focused on stereotypes founded in schema, or a bottom-up approach examining perceived typicality. One additional theory, the Dynamic Interactive Theory of Person Construal, suggests that top-down and bottom-up processing approaches occur in a rapid and interactive fashion. Exploring GRMMIQIQ through multiple lenses, as through the Dynamic Interactive Theory of Person Construal, might allow for not only a greater understanding of the causal antecedents of

GRMMIQIQ experiences, but also a greater understanding of how these theoretical frameworks may function and may be leveraged to understand real world circumstances.

Study 1a used the reverse correlation (RC) technique to generate unique classification images (CIs) reflecting average mental representations of Black and White, transgender and cisgender women. Participants (N=198) completed the RC procedure which was then used to develop CI images for study 1b. In study 1b, CI images were categorized as "cisgender" or "transgender" and rated by US based participants (N = 201) on multiple dimensions. While participants reliably categorized cisgender CIs as "cisgender," transgender CIs were not reliably categorized as "transgender."

Study 2 follows this by using a point of subjective equality (PSE) person perception framework to explore how varying degrees of perceived gender atypicality in digitally modified visual stimuli might yield transgender identity status categorization. Participants (N=152) classified 22 digitally morphed images as either cisgender or transgender in a two-interval forced choice task. Images that crossed the PSE threshold (i.e., images that had a greater than 50% likelihood of being classified as "transgender") and had the highest likelihood of being classified as "transgender" were used as the "perceived transgender" stimuli in study 3, while the corresponding base images were used as the "perceived cisgender" stimuli.

Study 3 recruited students who were in healthcare training programs that could yield a diagnostic professional position (i.e., MD, DO, NP, and PA programs; N=103). Participants were then presented with a standardized acute care vignette reflecting a woman experiencing symptoms consistent with a closed, isolated fracture of the medial malleolus (i.e., a type of ankle fracture), one of the four visual stimuli, and one of two medical histories. In a four-minute period, participants read the scenario, and provided a diagnosis, their perspectives as to the

causal antecedents of this diagnosis, and any further questions they might like answered. Medication consistent with hormone replacement therapy (HRT) was listed and standardized in all conditions. Responses were coded for the presence of GRMMIQ as it related to HRT. The impact of target race, visual gender typicality, and explicit gender identity on invasive questioning and medical misattribution was assessed using a multiple linear regression approach. While all overall models were non-significant, several potential explanations, including a lack of power, may have attributed to these findings. Overall, invasive questioning was noted in the responses from 9 participants (8.8%), while potential or explicit medical misattribution related to HRT was noted in in the responses from 20 participants (19.6%). Taken together, results from all three studies suggest that categorization and perception of transgender individuals is significantly more complex and nuanced than categorization of other groups. Future research should extend the results on transgender perception and categorization, while also exploring other potential avenues by which GRMMIQ may occur.

"Trans broken arm syndrome": Examining person causal antecedents of discrimination towards gender minority populations in healthcare settings through the lens of person perception

Terminology

Gender minority is a term that is used to refer to individuals or populations of individuals whose gender identity, gender expression, or gender roles do not conform to the gendered norms associated with the sex they were assigned at birth (Centers for Disease Control and Prevention, 2019; Hendricks & Testa, 2012). While the term "transgender" has been used in a similar way as an umbrella incorporating gender presentation and expression with gender identity (Serano, 2016), for the purposes of this research, this term will be restricted to expressing a gender identity that is not aligned with an individuals assigned sex at birth. Assigned sex at birth is a term that reflects the sex that the individual was proclaimed to be on their birth certificate and is also known as a person's birth sex or natal sex. For example, a transgender woman is an individual who was assigned male at birth and now understands herself to be a woman. The term "binary gender" reflects a gender identity within the commonly perceived "male-female" pseudo-dichotomy, while the term non-binary reflects those who experience gender outside of the commonly perceived binary system. Finally, the term cisgender reflects those whose gender identity is in congruence with their assigned sex at birth.

Introduction

Jane is a 32 year-old transgender woman from Massachusetts. One year ago, she was seeking treatment from a specialist for chest pain and an irregular heartbeat. The new provider, she reported, was fixated on the fact that Jane was undergoing hormone replacement therapy (HRT), and worried that these issues might be the result of a blood clot caused by the administration of estradiol. Even after an ultrasound had proved that the chest pain and irregular heartbeat were not being caused by a blood clot (and thus likely not attributable to HRT), the physician continued to insist that Jane would be "better off not taking [estradiol]" (Wall et al., 2023).

Such experiences are not uncommon for gender minority populations and are only one of the challenges faced by gender minority populations when it comes to accessing and utilizing health care. Transgender populations face a medicalization of gendered experiences, where they are often required to undergo interactions with medical professionals in order to be socially and, in cases where the option is available, legally recognized in their gender identity (Johnson, 2015). This leaves transgender individuals in a position where they are required to navigate and engage with a cisgender focused medical system. In some cases, this can lead to denial of service and experiences of outright scientific denialism (Sumerau & Mathers, 2019). One example of science denialism can be seen in the writings of Dr. Paul McHugh and his colleagues who have made claims that gender affirming care is linked to higher rates of suicide and poor mental health outcomes in transgender individuals (Mayer & McHugh, 2016; McHugh, 2014; Van Mol et al., 2020). These claims rely on a misreading of research comparing psychological distress between transgender individuals who have received gender affirming care and their cisgender counterparts (Dhejne et al., 2011) and run contrary to substantial evidence among both youth and

adults that gender affirmation yields significant benefits to mental health (Bränström & Pachankis, 2020; Colton Meier et al., 2011; Davis & Colton Meier, 2014; Dhejne et al., 2016; Olson et al., 2016; Sorbara et al., 2020). Unfortunately, such science denialism can prove foundational to battles against reasonable access to gender affirming medical care in both adults (Harlan, 2017) and adolescents (Laidlaw et al., 2019).

If gender minority individuals choose to seek gender confirming medical care (e.g., HRT), they can face numerous gatekeeping practices where psychologists, physicians, or insurance companies stand between a transgender person and accessing the care that they are seeking (Almazan et al., 2020; Ashley, 2019; Budge, 2015; Dubov & Fraenkel, 2018; Vincent, 2019). Beyond issues of gatekeeping, gender minority populations have reported having numerous barriers to accessing care, among which systemic barriers (e.g., affordability, insurance coverage, legislation), a lack of knowledgeable practitioners, and discrimination are particularly noted. These barriers can, and often do, lead to delayed care (Gridley et al., 2016; Jaffee et al., 2016; James et al., 2016). Such delays can lead to a greater need for mental and physical healthcare, as well as worse long-term outcomes (Seelman et al., 2017; Weissman et al., 1991), thereby perpetuating a vicious cycle of inequality.

One of the many barriers transgender individuals face that prevents equitable healthcare is a lack of provider knowledge and cultural competency. For example, the 2015 United States Transgender Survey (USTS), a large-scale cross-sectional survey examining the experiences of 27,715 transgender people across multiple domains, reported that nearly one in four gender minority individuals had to teach their medical providers about transgender related health while 15% reported being asked unnecessary questions that were unrelated to reasons for acute healthcare visits (James et al., 2016). In many cases, healthcare practitioners themselves report a

lack of knowledge about gender minority related healthcare, as well as a reluctance to provide healthcare for gender minority individuals (Carabez et al., 2016; Dy et al., 2016; Snelgrove et al., 2012; Unger, 2014). While education has been shown to be effective in increasing willingness to treat transgender individuals (Nolan et al., 2020; Thomas & Safer, 2015), gaps in transgender focused medical education remain an ongoing concern (Dubin et al., 2018; Korpaisarn & Safer, 2018; Nolan et al., 2020). A lack of education and cultural competency about transgender individuals may also contribute to avoidance of certain medical procedures that are not perceived as gender confirming (e.g., prostate, breast, and cervical cancer screening) if providers are not known to have cultural competency or are known to engage with patients according to their assigned sex at birth rather than their actual gender (Ingham et al., 2018; M. J. Johnson et al., 2016; Peitzmeier et al., 2014, 2017; Tabaac et al., 2018). A failure to engage in cancer screenings, in particular, can lead to late detection of cancer, which is associated with potentially disastrous results (Badgwell & Bast Jr., 2007; Cuzick et al., 2014; Etzioni et al., 2003; Scardino et al., 1992).

Transgender Identity-based Discrimination in Healthcare

Transgender individuals also face significant discriminatory experiences in healthcare settings that range from the systemic to the interpersonal. Insufficient insurance coverage, a lack of policies mandating equitable and non-discriminatory healthcare and healthcare access, and high cost of healthcare function as systemic barriers to accessing healthcare for gender minority individuals. While health insurance is frequently seen as simply a “means for financing a person's health care expenses” (Barnett & Vornovitsky, 2016), access to insurance can increase the use of healthcare, reduce overall mortality rates, and increase individual wellbeing (Sommers

et al., 2017). When functioning within a for-profit medical system, such as the system within the United States, insurance is practically required. Unfortunately, transgender people are less likely to have insurance than their cisgender counterparts (James et al., 2016). This is likely due to the income and employment disparities faced by transgender individuals in conjunction with the role that employers play in access to health insurance (Blumenthal et al., 2020; Ciprikis et al., 2020; Crissman et al., 2016; Gruber & Madrian, 1997; James et al., 2016; Leppel, 2021). Even when transgender patients do have health insurance coverage, they may still face denial of care or a refusal to provide equitable care (Baldwin et al., 2018; Kattari et al., 2020; Nahata et al., 2017; Shires & Jaffee, 2015; Sumerau & Mathers, 2019), particularly in areas where equitable gender minority health is not mandated through policy initiatives (Goldenberg et al., 2020).

On the interpersonal level, the 2015 USTS suggested that one in three transgender individuals experienced at least one negative incident, ranging in type from misgendering to verbal abuse and physical assault, in healthcare settings that was related to their gender identity (James et al., 2016). Such experiences are particularly pronounced for individuals who are members of multiple marginalized minority populations. For example, transgender people of color report higher rates of discriminatory experiences in healthcare settings than their white counterparts (Howard et al., 2019; James et al., 2016; Kattari et al., 2015, 2017). Additionally, experiences of discrimination in healthcare settings are directly related to recognizability as being a member of a gender minority population; those who do not "pass" as cisgender are significantly more likely to be discriminated against in social services settings, mental healthcare settings, and general healthcare settings (Rodriguez et al., 2018). These discriminatory actions are not necessarily implicit – while there is still a paucity of studies exploring explicit attitudes

towards transgender patients, some work has reported the presence of explicit anti-transgender bias among healthcare workers (Dorsen, 2012; Rowan et al., 2019).

Links between lack of provider knowledge and discrimination

Three separate directional approaches have been used to explore the links between a lack of provider knowledge and discriminatory attitudes and behaviors exhibited by healthcare providers. In one approach, healthcare providers, faced with a lack of knowledge about transgender specific healthcare, may use stigmatizing attitudes and behaviors to reinforce power and authority in the face of uncertainty (Poteat et al., 2013). A second approach suggests that, regardless of education or educational opportunities, transphobia predicts provider knowledge of transgender related healthcare, with providers higher in transphobia being less likely to have adequate knowledge (Stroumsa et al., 2019). Finally, a third approach to understanding the links between transphobia and lack of provider knowledge suggests that while the two predict one another, they do so without a causal connection (McPhail et al., 2016). This final approach to understanding the links between discrimination and healthcare provider knowledge suggests that interventions to increase provider knowledge of transgender healthcare and reduce discrimination towards transgender individuals must be undertaken simultaneously.

Regardless of the directionality, or lack thereof, between stigma and provider knowledge, discrimination in healthcare is a reality for transgender individuals. Identification of the presence and fundamental causes of social and health disparities faced by minoritized populations is necessary to build towards health equity (Cerdá et al., 2014; Penman-Aguilar et al., 2016). As such, it is vital to explore and address both the root causes and the manifestations of discrimination towards transgender individuals in healthcare.

"Trans Broken Arm Syndrome"

One form of medical discrimination noted by transgender individuals in healthcare traverses the line between lack of provider knowledge and discriminatory experiences is gender related medical misattribution (GRMMIQ), colloquially known by the tongue-in-cheek term "trans broken arm syndrome" (Payton, 2015). GRMMIQ is a form of medical discrimination wherein a healthcare provider assumes a medical complaint is the result of a patient's gender identity or medical transition. This form of discrimination may manifest as unnecessary or invasive questions, or it may be the explicit attribution of gender identity or medical transition as the cause of the acute complaint (Brice, 2020; Dietz & Halem, 2016; Payton, 2015). While this form of discrimination has been referenced in the literature (e.g., Knutson et al., 2016; Paine, 2021), there has not, to date, been an in-depth exploration of GRMMIQ. This experience might be more common than expected. In a recent study exploring transgender experiences within healthcare settings, 26.5% of the sample reported being asked invasive or unnecessary questions about their gender identity, while 12.9% of the sample reported experiences of healthcare providers making claims the respondent's gender identity or medical transition was the cause of their medical complaints (Wall et al., 2023).

Categorization, Perception, and Bias

When confronted by novel circumstances, stimuli, or individuals, people tend to cognitively group them into meaningful categories based on their characteristics (Murphy, 2004; Rosch, 1978). Such categorizations provide individuals with the benefit of reduced cognitive effort, reduced time spent analyzing a new object, and socially adaptive and appropriate behavior. For example, when approached with a novel version of a known object, an individual will be able to rapidly make sense of the object and engage with it in a socially appropriate way

– they may, when confronted with a novel candy bar, decide to taste it rather than use it as a weapon. When such automatic categorization is applied to other people, however, the potential benefits of reduced mental and social burdens for the perceiver are tempered by the negative consequences for those perceived to be a member of a social outgroup. While it may be as innocuous as classifying others based on shirt color or a sports team (i.e., a minimal group paradigm) or as culturally salient as race-based classification, such categorization allows for an individual to rapidly sort and perceive others as one of "us" or one of the "them" (i.e., ingroup and outgroup). Such categorizations have a profound impact on stereotyping and prejudice (Brewer, 2007; Taylor & Falcone, 1982; Verkuyten & Hagendoorn, 1998), whether they are based on minimal group membership (Billig & Tajfel, 1973; Gaertner & Insko, 2000; Ratner & Amodio, 2013; Simon & Gutsell, 2020; Tajfel et al., 1971), racial group membership (Blascovich et al., 1997; Chen et al., 2014; Fazio & Dunton, 1997; Krosch et al., 2013), LGBT group membership (Hunt & Moodie-Mills, 2012; Melton & Cunningham, 2014), or membership within already minoritized groups (Matsick & Rubin, 2018).

Categorization, and the factors that might influence healthcare providers in such a way that the experience of GRMMIQ is made manifest, can be explored through multiple lenses within a social cognition framework. A top-down approach to understanding categorization would suggest that stereotypes and schemas, whether culturally endorsed or individually formed, might influence provider perceptions and judgements about their patient. A bottom-up approach might suggest that the provider is taking their cues from lower-level perceptual cues (e.g., cues based on face and eye shape; Jones et al., 2010) to form judgements about their patient. Finally, the Dynamic Interactive Theory of Person Construal (Freeman et al., 2011) suggests that top-

down and bottom-up processing interact with one another, as well as temporal influences, to build the provider's perceptions and judgements of their transgender patient.

Top-Down processing approach in acute incidences of discrimination

A top-down processing approach would examine how stereotypes held by healthcare providers might influence their treatment and diagnosis of transgender patients. Stereotypes influence perceptions of a patient's trustworthiness (Schäfer et al., 2016), beliefs about the likelihood of a patient adhering to medical recommendations (Stone, 2005), and can influence quality of care (Phelan et al., 2015). Stereotype activation has been shown to impact physician performance, even when the physicians had no recollection of seeing a stereotype inducing prime (Moskowitz et al., 2012). Indeed, stereotypes have been previously shown to have a considerable impact on physician diagnosis when working with women and with patients from minoritized racial and ethnic groups (Burgess et al., 2006; Fidell, 1980; Sabin et al., 2008). Stereotypes about transgender individuals might lead to unequal treatment and outright discrimination in medical settings.

There are numerous culturally and individually held stereotypes about transgender individuals in the United States. Regardless of whether damaging stereotypes about transgender people have been spread through the use of popular media (Lester, 2015), through anti-transgender activist groups (McLean, 2021), religious organizations (Crasnow, 2021), or political parties (DeGagne, 2021), they are present and are often culturally endorsed. Previous research has documented culturally endorsed stereotypes about transgender individuals including, but not limited to, "deviant", "mentally ill," "disgusting," and, notably, "untrustworthy" (Howansky et al., 2019). Each of these stereotypes could impact how providers perceive acute complaints from

gender minority individuals, as well as how they would perceive the patient themselves and how they might approach treatment.

Bottom-up processing in acute incidences of discrimination

A bottom-up approach, on the other hand, suggests that providers are taking note of visual and audio input (e.g., face, body, and voice) in order to perceive and sort their patients into categories that influence judgement and perceived trustworthiness (Dotsch et al., 2016; Todorov, Mende-Siedlecki, et al., 2013; Todorov et al., 2015). Typicality, in this case, would directly influence decision making and perceived trustworthiness; those who are typical are perceived as good and trustworthy (Sofer et al., 2015). When taken with previous research suggesting that those who are perceived as trustworthy are afforded higher priority in medical situations (Bagnis et al., 2020), it follows that those who appear atypical (and untrustworthy) would face difficulties in medical care.

Bottom-up processing can play an important role in the overall treatment of transgender individuals. Previous work has suggested that those who present as gender non-conforming or who appear to have gender non-conforming traits are subject to higher levels of both explicit and implicit bias (Atwood & Axt, 2021). A transgender woman, for example, might have multiple traits that are perceived by individuals who are not as familiar with transgender people as "masculine," thereby reducing target typicality. Such difficulties in categorization have been shown to impact attitudes towards transgender people, particularly in individuals who identify as conservative (Stern & Rule, 2018) and those who have a high need for closure (Makwana et al., 2018). Considering that bottom-up processing evaluations are reflected in rapid decision making (Harreveld et al., 2004), the impact time pressure plays in bias during the diagnostic process (FitzGerald & Hurst, 2017; Stepanikova, 2012), as well as the clear role that perceived gender

typicality has on multiple forms of discrimination (Kattari et al., 2015; Rodriguez et al., 2018), bottom-up processing likely plays a major role in the manifestation of GRMMIQ.

Dynamic Interactive Theory of Person Construal

Finally, some work has suggested that bottom-up and top-down processing may occur simultaneously and interactively (Freeman et al., 2012; Quinn & Macrae, 2011; Sherman et al., 2014). The Dynamic Interactive Theory of Person Construal, for example, not only suggests interactions between top-down and bottom-up perceptual processing of individuals, but a temporal component as well (Fig.1, Freeman et al., 2011). That is, perception and categorization of others likely relies on a complex, interactive system of top-down and bottom-up processing that is impacted by time. A patient may initially be perceived as having gender -typical facial features, but this perception is then impacted by a physician's knowledge that they are transgender. This might cause the physician to reconsider their initial perceptions of the patient, leading them to mentally recategorize them. This process may continue until the physician has a stable mental categorization of the patient, and it may have a lasting impact on the physician's recollection about and evaluations of the patient (Wittlin et al., 2018).

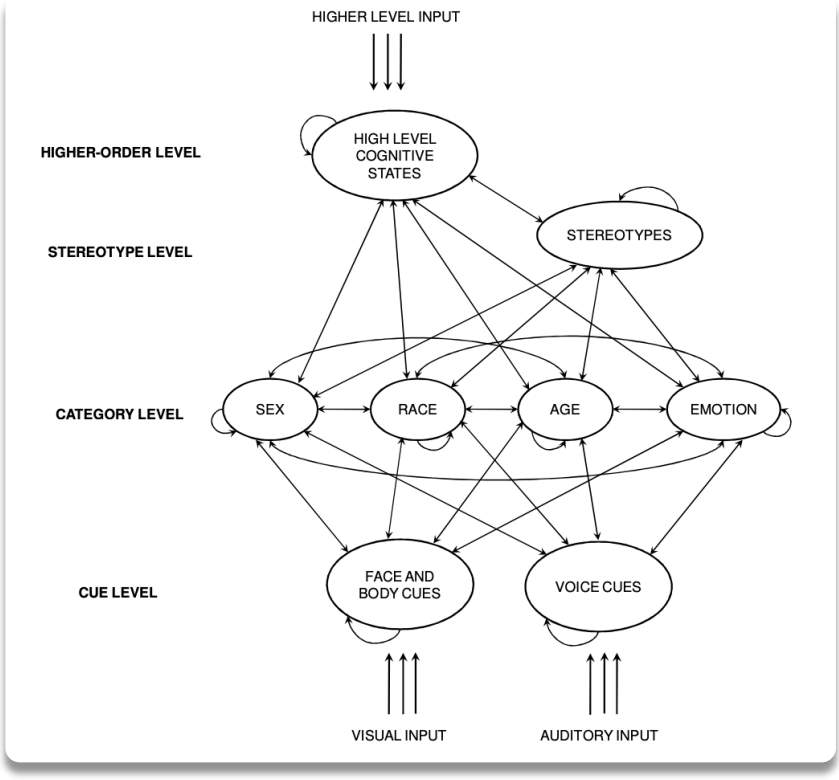


Fig.1 Dynamic Interactive Model of Person Construal (Freeman & Ambady, 2011)

Approaching the provider misdiagnosis aspect of GRMMIQ through the lens of the Dynamic Interactive Theory of Person Construal allows for experimental manipulations based on several cognitive variables. Stereotypes about transgender individuals (reflecting top-down processing) can be manipulated by the inclusion or exclusion of an explicit gender minority identity status. Using different stimuli that either reflected perceived transgender or cisgender gender identity status can provide an opportunity to manipulate perceived cues (reflecting bottom-up processing). Moreover, the incorporation of the additional variable of race using visual stimuli can provide an opportunity to explore differences on the stereotype and cue level (reflecting both top-down and bottom-up processing simultaneously) while also allowing for an exploration of potential intersectional forces of discrimination. Such an approach can provide an ideal opportunity to explore multiple factors influencing the potential for provider misdiagnosis

while also providing an opportunity to assess, in an analogue setting, the Dynamic Interactive Theory of Person Construal articulated by Freeman & Ambady (2011). For example, should main effects be found for explicit gender identity without main effects for perceived transgender identity, it would further support top-down processing theories, while the alternate outcome would cast support for bottom-up processing theories. A two-way interaction, in this case, would suggest that both top-down and bottom-up processes are occurring in a rapid and iterative fashion.

Research Aims and Hypotheses

The proposed research aims to explore the impact that multiple top-down and bottom-up categorization processes have on perceived patient trustworthiness, medical treatment, and diagnostic accuracy for transgender patients. To do so, the current research will examine the impact that categorization, and potential categorization process interactivity, might have on a GRMMIQ through the use of a standardized patient vignette that manipulates cues impacting bottom-up processing and top-down processing to examine factors that might impact GRMMIQ.

Aim 1: To examine the impact that explicit transgender identity status, perceived transgender identity status, and race have on the misattribution of HRT as being a causal antecedent of an acute complaint in an analogue healthcare setting.

Hypothesis 1: Ostensible patients who are explicitly said to be transgender, are perceived as being transgender, and are Black (and therefore a member of a racial minority group) will have a greater likelihood of an incorrect causal attribution of the acute condition to HRT. Significant two- and three-way interactions reflecting a greater likelihood of a casual misattribution of HRT to the acute condition are expected for those who are members of multiple marginalized populations.

Aim 2: To examine the impact that explicit transgender identity status, perceived transgender identity status, and race have on perceived patient trustworthiness.

Hypothesis 2: Ostensible patients who are explicitly said to be transgender, are perceived as being transgender, and are Black will be perceived as less trustworthy. Significant two- and three-way interactions reflecting lower levels of perceived trustworthiness are expected for those who are members of multiple marginalized populations.

Exploratory aims: To explore the impact that explicit transgender identity status, perceived transgender identity status, and race have on a healthcare provider's willingness, comfort, and perceived competency in working with the ostensible patients.

Methods and Results

Study 1 – Stimuli development through a two-step Reverse Correlation procedure

Study 1 used a two-step Reverse Correlation (RC) procedure to create and attempt to validate average mental representations of Black and White, transgender and cisgender individuals intended for use in study 2. The RC procedure provides a unique opportunity to create visual stimuli that reflect mental representations of particular categories of individuals in a data driven way (Dotsch & Todorov, 2012; Todorov, Dotsch, et al., 2013). This technique has previously been used to look at White participants' mental representations of non-White races (Krosch & Amodio, 2014), gendered representations of professions (Degner et al., 2019), and mental representations of sexual harassment victims (Goh et al., 2021), as well as to understand the interactions between face perception and behavior in racial contexts (Krosch & Amodio, 2014).

The categorization image (CI) generation phase is the first step of the two-step RC procedure. In the CI generation phase, participants are randomized to a category-based condition,

presented with a series of pairs of similar images, and asked which image looks most like a particular category of person (i.e., a two-interval forced choice; 2-IFC). For example, participants may be presented with two very similar pictures of people and asked to decide which of the two images look most like a teacher (Degner et al., 2019). Choices made by participants in each condition are used to develop CIs reflecting mean mental representation of each category.

In the second step of the two-step RC procedure, the CI rating phase, a separate set of unique and condition naïve participants are recruited to provide their perceptions about the CIs. In this step, participants make a forced dichotomous categorization decision about the CI's transgender identity status, as well as providing several exploratory ratings about each of the produced stimuli. This provides an opportunity to assess how each stimuli impact categorization through bottom-up processing, while confirming that these stimuli are reliably categorized as belonging to their condition specific gender identity status.

Study 1a: CI Generation Phase

Methods and Measures

Sample

The CI generation phase recruited undergraduate students at Virginia Commonwealth University (N = 198). Participants were assigned to one cell of a 2 (Race: Black, White) X 2 (Categorization group: transgender woman, presumed cisgender woman) factorial design. The intended sample was designed to have a greater number of participants per cell than some previously used RC CI generation tasks (Brinkman et al., 2019; Goh et al., 2021; Krosch & Amodio, 2014) in order to reduce the number of categorization trials that each participant was required to complete while also allowing for flexibility to remove participants who failed to

correctly answer attention and quality checks. Of the 198 participants who were recruited and completed the study, 196 (99%) were retained. Respondents (n=2) were excluded for a failure to successfully complete the attention question in the study.

Procedure

Participants (N=198), consisting of undergraduate students at Virginia Commonwealth University were recruited from the undergraduate participant pool. They then completed consenting procedures, affirmed their intention to answer questions accurately, and were randomly sorted to one cell of a 2 (Race: Black ambiguous face, White ambiguous face) X 2 (Categorization group: transgender woman, presumed cisgender woman) factorial design. Following consenting procedures, participants were redirected to one of two 400-trial RC tasks (i.e., Black or White ambiguous base face) and were asked to choose which face in each trial looked most like either a "woman" (cisgender woman presumed condition) or a "transgender woman" (transgender condition). Following the completion of the categorization task, participants completed demographics which included a single attention check item ("What color is the sky?"). Participant characteristics are noted in table 1. Due to programming issues related to participant drop out and replacement, participants were unequally assigned conditions (Black transgender woman: n=48; White transgender woman: n = 46; Black presumed cisgender woman: n=46; White presumed cisgender woman: n = 56).

Reverse Correlation Task

Prior to the CI generation phase, two ambiguous base images (fig. 2; Black gender-ambiguous, White gender-ambiguous) were created from an average of 92 male and 92 female

Black and White faces from the Chicago Face Database (Ma et al., 2015). Each of these ambiguous images had 400 randomized patterns of original and inverse sinusoidal noise patterns superimposed upon them (fig. 2; sinusoidal noise pattern, Original Noise, Inverse Noise), creating 800 variant images in 400-trial pairs for each of the ambiguous base images (R package rcicr 0.3.4.1; Dotsch, 2016).

The RC CI generation task required participants to engage in a 2-IFC task – participants were asked which of the two images in each trial looked like a member of the group that the participant was assigned to categorize. For example, participants assigned to the "Black presumed cisgender woman" condition were redirected to the Black gender-neutral base RC CI generation task and were asked "Which face looks most like a woman?" while participants in the "Black transgender woman" condition would see the same RC CI generation task and be asked "Which face looks most like a transgender woman?" The first example is notable in that it does not include the word "cisgender," however it relies on the established automatic assumption that participants will engage in gender typical categorization (as noted in Wittlin et al., 2018).

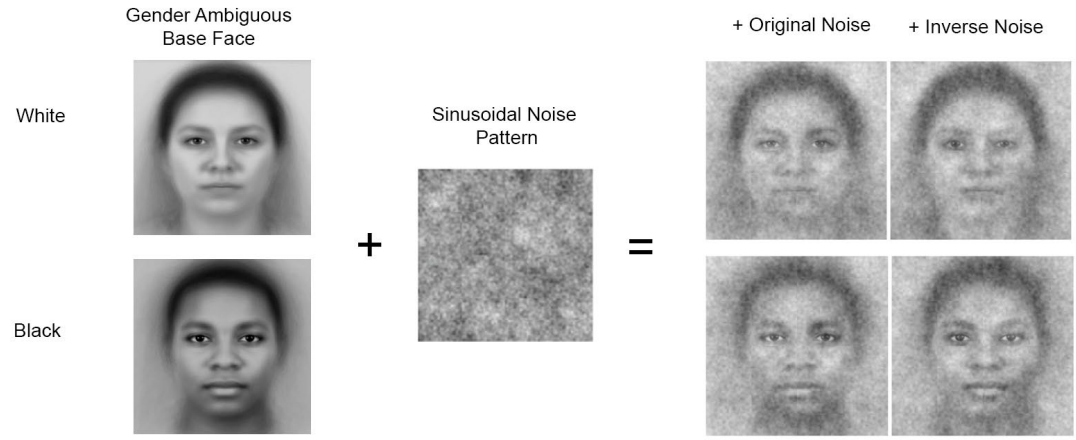


Fig 2. Reverse Correlation Procedure: Classification image generation – Participants engage with a total of 400 image pairs in a two-interval forced choice task and are asked which of the two looks most like a particular category (e.g., "Which face looks most like a transgender woman?")

Attitudes Towards Transgender Women

Participants also completed the Attitudes Towards Transgender Women (ATTW) subscale of the Attitudes Towards Transgender Men and Women Scale (ATTMW; Billard, 2018). In contrast to other commonly used measures of transphobia that assess attitudes towards those who exhibit gender non-conformity and transgender issues in general (Hill & Willoughby, 2005; Nagoshi et al., 2008), the ATTMW was developed and designed in an attempt to explore attitudes towards specific categories of individuals (i.e., binary transgender men and women) that fall under the transgender identity umbrella. This makes the ATTW subscale of the ATTMW ideal to explore explicit attitudes towards transgender women, and the potential impact that such attitudes may have on interactions with a patient who is a transgender woman. The ATTW consists of 12 items that assess individual attitudes towards transgender women (e.g.,

"Transgender women only think they are women"). Agreement with these items is measured on a 0-100 scale (0= Strongly Disagree, 100 = Strongly Agree), with higher scores suggesting more negative attitudes towards transgender women. It is important to note that these particular questions reflect specific *beliefs* about transgender women; while beliefs about a target are certainly a fairly strongly weighted piece of the overall attitude construct, additional aspects (e.g., feelings about a target) remain (Greenwald et al., 2013). In the context of this study, this scale had excellent internal reliability ($\alpha = 0.96$).

Quality Check, Attention check, and Demographics

Participants completed one quality check consisting of an affirmation that they would "thoughtfully provide your best answers to the questions in the survey." Participants also completed an attention check (i.e., "What color is the sky?"). Participants who failed to answer the attention check ($n = 1$), or who indicated an incorrect answer to attention check ($n = 1$), were removed from analysis.

Participants were asked to indicate their age, gender, racial/ethnic identity, work status, year in school, GPA, sexual orientation, political orientation, and transgender identity status. Racial/ethnic identity and work status were collected categorically, and participants were able to select all categories that applied. Year in school was collected using a categorical, ordinal scale. Political orientation was collected using a 0-100 scale (0 = Liberal, 100 = Conservative) on three measures assessing overall political orientation, political orientation on social issues, and political orientation on economic issues (Carney et al., 2008; Kugler et al., 2014). Age, gender, and sexual orientation were collected using free response entries, with age being restricted to numerical responses. Gender was recoded into several unique categories using the gendercoder package in R (Beaudry et al., 2020).

Procedure

Participants (N=198), consisting of undergraduate students at Virginia Commonwealth University were recruited from the undergraduate participant pool. They then completed consenting procedures, affirmed their intention to answer questions accurately, and were randomly sorted to one cell of a 2 (Race: Black ambiguous face, White ambiguous face) X 2 (Categorization group: transgender woman, presumed cisgender woman) factorial design. Following consenting procedures, participants were redirected to one of two 400-trial RC tasks (i.e., Black or White ambiguous base face) and were asked to choose which face in each trial looked most like either a "woman" (cisgender woman presumed condition) or a "transgender woman" (transgender condition). Following the completion of the categorization task, participants completed demographics which included a single attention check item ("What color is the sky?"). Participant data for the RC task exhibited no missing data. All study materials and code are available on the OSF (https://osf.io/br87x/).

Results

Sample characteristics

Participants for study 1 were relatively young (M = 19.47, SD = 1.87), generally more liberal (M = 25.31, SD = 19.81), were comprised mostly of individuals who self-identified as women (n = 142; 72.45%). The sample was relatively racially and ethnically diverse, with fewer than one-third of participants self-identifying as white and non-Latine (n = 61; 31.12%). Full demographic information can be found in table 1.

Table 1. Demographic characteristics for study 1a	
Demographic Characteristics (N = 196)	
Age	
Range	18-34

	M (*SD*)	19.47 (*1.87*)
Political Orientation		
	Range	0-95
	M *(SD)*	25.31 (*19.81*)
Attitudes Towards Transgender Women		
	Range	0-100
	M (*SD*)	18.10 (*23.84*)
GPA		
	Range	0-4
	M (*SD*)	3.26 (*0.66*)
Gender, n (%)		
	Woman	142 (72.45)
	Man	45 (22.96)
	Gender Diverse	9 (4.59)
	Nonbinary	4 (2.04)
	Gender fluid/genderqueer	2 (1.02)
	boi, demigirl, non binary male	3 (1.53)
Transgender, n (%)		
	Yes	10 (5.10)
	No	186 (94.90)
	Missing	1 (0.51)
Sexual Orientation, n (%)		
	Heterosexual/Straight	126 (64.28)
	Bisexual or Bi-curious	37 (18.88)
	Homosexual, gay, or lesbian	11 (5.61)
	Pansexual	6 (3.06)
	Asexual or demisexual	3 (1.53)
	Another category	9 (4.59)
	queer	1 (0.51)
	what	1 (0.51)
	Unknown	1 (0.51)
	Gendered category (e.g., "male")	6 (3.06)
	Missing	2 (1.02)
Race/Ethnicity, n (%)		
	white (Non-Latine)	61 (31.12)
	Asian	46 (23.47)
	Black	40 (20.41)
	Biracial or Multiracial	18 (9.18)
	Hispanic/Latino/Latine	11 (5.61)
	white Hispanic/Latino/Latine	8 (4.08)
	Black Hispanic/Latino/Latine	3 (1.53)
	Middle Eastern	7 (3.57)
	Native Hawaiian or other Pacific Islander	1 (0.51)
	Another identity not listed	1 (0.51)
Year in college, n (%)		

	Freshman	109 (3.40)
	Sophomore	44 (48.98)
	Junior	26 (6.80)
	Associate's Senior	16 (10.89)
	Non-degree seeking student	1 (0.51)
Employment status, n (%)		
	Employed full or part time	75 (34.27)
	Not employed, but looking for work	18 (9.18)
	Not employed, not looking for work	5 (2.55)
	Only listed "Student"	98 (50.00)

RC Categorization task results

The sinusoidal noise patterns congruent with participants' conditions were averaged together using the 'rcir' package in R (R package rcicr 0.3.4.1; Dotsch, 2016) to create a total of 4 CIs, two per race condition (fig. 3). It is important to note that these procedures were used to create an average mental representation across participants (i.e., a group aggregate) rather than individual representations that may differ based on numerous factors.

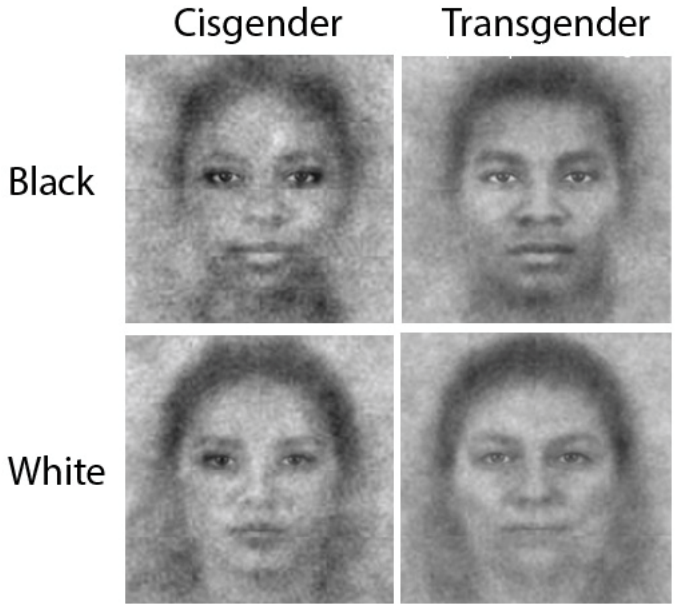


Fig. 3. Images resulting from the CI generation phase

Study 1b: CI rating phase

Methods and Materials

Sample

The CI rating phase recruited unique, condition naïve participants (N=199) using the online participant recruitment platform Prolific. Prolific was designed to function as an online participant recruitment platform for social, behavioral, and economic research. Previous research has suggested that Prolific may have significant advantages over other online participant recruitment platforms including more diverse samples with higher quality data (Palan & Schitter, 2018; Peer et al., 2017). Upon joining Prolific, participants are invited to answer about 175 questions that assess demographic characteristics, political beliefs, and additional topics. The answers provided by potential participants provides researchers an opportunity to engage in targeted recruitment. This tool has been used in multiple lines of research exploring topics ranging from political opinions (Vescio & Schermerhorn, 2021) to the likelihood of vaccine uptake and engagement in other protective behavior during the COVID-19 pandemic (Agley et al., 2021; Moussaoui et al., 2020) to perceptions of police and policing in America (Jackson et al., 2020). One participant was removed for failure to complete study procedures.

Procedure

Participants from a diverse sample in the United States were recruited using the Prolific participant recruitment platform. Participants were then randomly assigned to view one of the four CI faces. While viewing the faces, participants were asked to rate their perceptions of the target CI on multiple dimensions using a 0-100 scale (e.g., 0 = Not at all feminine, 100 =

Completely feminine). Following completion of the scale ratings, participants were informed that the image they were viewing was an image of a woman, were provided definitions of "cisgender" and "transgender," and were be asked to make a binary determination about the target CI's transgender identity status (Cisgender = 0, Transgender = 1). Participants then completed demographic measures including an attention check ("What color is the sky?"). The median time for completion of this study was two and a half minutes, and participants were provided financial compensation in recognition of their time and effort ($0.60).

Face Ratings

Each of the four resulting CI images were rated by participants on five primary dimensions: masculinity, femininity, trustworthiness, perceived physical health, perceived target mental health, target age, and level of comfort in viewing the face (e.g., "How feminine does this face look?"). Each of these ratings were made on a 1-100 scale (e.g., 0 = Not feminine at all, 100 = Completely feminine). Similar or identical face ratings have been used on numerous occasions for exploring trustworthiness, power, and dominance in randomly generated faces (Todorov et al., 2008), how relationship status impacts rating attractiveness ratings of CIs (Karremans et al., 2011), and how femininity in a CI may be linked to perceptions about the likelihood of the target having an eating disorder (Douglas et al., 2021). All face ratings are considered exploratory for analysis purposes.

Face categorization

Participants were provided definitions of transgender (i.e., "Some individuals have a gender identity that is different from the one that they were assigned at birth. These individuals

are often referred to as transgender") and cisgender (i.e., "Individuals who have a gender identity that is the same as the one that they were assigned at birth are referred to as being cisgender"). Participants were then asked to make a binary determination about the target CI's transgender identity status (Cisgender = 0, Transgender = 1).

Quality Check, Attention check, and Demographics

Participants completed the same quality and attention checks listed in study 1a. Participants also answered questions related to their age, gender, transgender identity status, work status, race/ethnicity, sexual orientation, political orientation, and household income. Finally, participants were asked to provide any additional feedback that they might have. Demographics were recoded in the same fashion as in study 1a.

CI rating statistical analysis plan

Stimuli categorization was assessed using a series of one-sample t-tests to determine whether the likelihood of categorization of a CI as transgender was significantly greater than chance (i.e., .5) in the case of transgender CIs or statistically less than chance in the case of the cisgender CIs. Additionally, a multiple linear regression was used to determine how transgender identity categorization condition (TICC: transgender woman, cisgender woman), CI-generation phase race categorization condition (RCC: Black, white), and the interaction of the two may have impacted the *likelihood* of categorization of the target as transgender.

The likelihood of CI targets being categorized as transgender and differences in perceptions of the CI targets (i.e., masculinity, femininity, trustworthiness, perceived physical health) were assessed using a series of multiple linear regressions using the TICC and RCC as

predictors. Holm-Bonferroni correction was used to address issues of multiple analyses. It was hypothesized that the CI target categorization analyses would result in significant main effects for TICC, RCC, as well as a significant interaction between TICC and RCC. Such results would suggest that targets in the transgender and Black conditions would be more likely to be categorized as "transgender," and that the target labeled as Black and transgender would be the most likely to be categorized as "transgender." As scale items were considered exploratory, no directional hypotheses were generated. All study materials and code are available on the OSF (https://osf.io/br87x/).

Results

Sample characteristics

Of the 198 participants retained for data analysis, the mean age was 33.54 (SD = 12.6, range 18-79). The majority of participants (n= 193; 97.5%) indicated that they were not transgender. Just over half of the participants self-identified using a masculine label (n = 100; 50.1%), while the remainder of participants self-identified using a feminine label (n=94; 47.5%), as non-binary (n=3; 1.5%), and as transmasculine (n = 1; 0.5%). The majority of participants were also white, non-Latine (n=130; 65.66%), and were employed full or part-time (n=123, 62.1%). Participants displayed a wide range of household incomes (M = $65077.51, SD = 45447.58, range $1000 - $250000). Complete demographics can be found in table 2.

Table 2. Demographic characteristics for study 1b	
Demographic Characteristics (N = 198)	
Age	
Range	18-79
M (*SD*)	33.54 (*12.6*)
Political Orientation	

	Range	0-100
	M *(SD)*	33.69 (*26.25*)
Household Income ($)		
	Range	1000 – 250000
	M *(SD)*	65,077.51 (*45,447.58*)
Gender, n (%)		
	Man	100 (50.50)
	Woman	94 (47.47)
	Gender Diverse	4 (2.03)
	Nonbinary	3 (1.52)
	Transmasculine	1 (0.51)
Transgender, n(%)		
	Yes	5 (2.5)
	No	198 (97.5)
Sexual Orientation, n (%)		
	Heterosexual	152 (76.77)
	Bisexual	26 (13.13)
	Homosexual, gay, or lesbian	5 (2.53)
	Asexual	4 (2.02)
	Pansexual	2 (1.01)
	Queer	2 (1.01)
	A gendered category (e.g. female, cisgender)	6 (3.09)
	Missing	1 (0.51)
Race/Ethnicity, n (%)		
	White (Non-Latine)	130 (65.66)
	Black	19 (9.60)
	Hispanic/Latino/Latine	15 (7.58)
	Biracial or Multiracial	15 (7.58)
	Asian	10 (5.05)
	white, Hispanic/Latino/Latine	7 (3.54)
	Black, Hispanic/Latino/Latine	1 (0.51)
	Latino/Mestizo	1 (0.51)
	Middle Eastern	1 (0.51)
Education, n (%)		
	Middle School	5 (3.40)
	High School	72 (48.98)
	GED	10 (6.80)
	Associate's Degree	16 (10.89)
	Vocational Degree	3 (2.04)
	Bachelor's Degree	41 (27.89)
Employment status, n (%)		
	Employed full or part time	134 (67.68)
	Not employed, but looking for work	22 (11.11)
	Not employed, not looking for work	20 (10.10)
	Student only	20 (10.10)

On disability	2 (1.01)

Categorization

Categorization was assessed using a binary outcome (0=Cisgender, 1=Transgender) among participants in four cells: Black cisgender (BC; n = 50), Black transgender (BT; n = 50), white cisgender (WC; n = 50), and white transgender (WT; n = 48). One of the four planned t-tests (BC) could not be conducted due to uniform responding; that is, all participants categorized the CI image as "cisgender." Results from the BT condition were non-significant, $t(49) = -0.84$, $p = 0.80$, suggesting that these CIs were not reliably categorized as transgender. Similarly, the CI in the WC condition was reliably categorized as "cisgender," $t(49) = -1751.8$, $p < .001$, while the CI the WT condition was not reliably categorized as "transgender" $t(47) = -8.88$, $p = 1.00$. A follow-up t-test examining the likelihood of "cisgender" categorization in the "transgender" conditions suggested that the CI from the WT condition was reliably categorized as "cisgender," $t(47) = -8.88$, $p < .001$. Overall, these results suggested that the targets in the cisgender CI conditions reliably categorized as "cisgender" while targets in the transgender CI conditions were not reliably categorized in a similarly concordant fashion. Indeed, in the case of the white transgender CI condition, the target was reliably categorized as "cisgender." Overall categorization proportions can be found in table 3.

Table 2. Proportions of trials categorized as transgender by morph composition and target racial category		
Target Race	**Male-Female composition**	**Proportion of trials categorized as transgender**
Black	100-0	0.10
	90-10	0.11
	80-20	0.13
	70-30	0.20
	60-40	0.39
	50-50	0.55
	40-60	0.48
	30-70	0.38
	20-80	0.31
	10-90	0.30
	0-100	0.27
White	100-0	0.20
	90-10	0.30
	80-20	0.49
	70-30	0.60
	60-40	0.73
	50-50	0.66
	40-60	0.50
	30-70	0.32
	20-80	0.22
	10-90	0.20
	0-100	0.18

A multiple linear regression was conducted to examine whether CI generation conditions (i.e., TICC & RCC), or their interactions, impacted the likelihood of a CI being categorized as "transgender." The overall model was significant, $R^2 = 0.24$, $F(3, 194) = 20.84$, $p < .001$), though it is vital to note that this significant effect was entirely driven by the interaction of TICC & RCC ($\beta = 0.38$, $p < .001$). These results suggest that neither TICC nor RCC were sufficient to lead to "accurate" categorization of the target CI, but relied upon one another to yield transgender categorization from the independent raters.

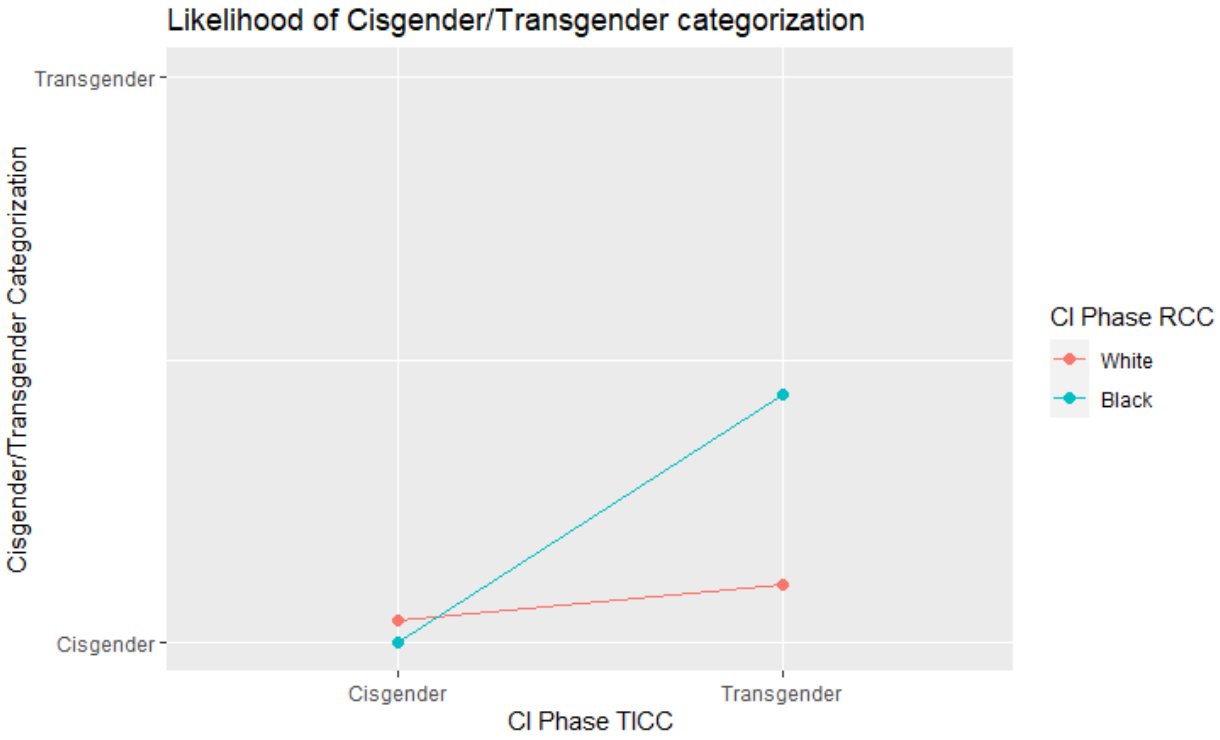


Fig. 4. "Transgender" categorization likelihoods based of CI generation phase TICC and RCC.

CI Ratings

In addition to overall categorization, participants rated the 4 CIs on dimensions of masculinity, femininity, trustworthiness, perceived mental and physical health, perceived age, and how comfortable the participant was viewing the target face. Each of these categorizations was assessed using a series of multiple linear regressions. After applying Holm-Bonferroni method to account for familywise error, overall models were significant for masculinity, femininity, trustworthiness, and physical health. All models are noted in table 4, main effects and interactions from significant models are noted in table 5, graphs for masculinity and femininity can be seen in figure 5, and additional graphs for other categories can be found in appendix C.

Table 4. CI Ratings			
Rating type	*F* statistic	Adjusted R^2	*p-value*
Masculinity*	$F(3,194) = 125.8$	0.66	< .001
Femininity*	$F(3,194) = 112.4$	0.63	< .001
Trustworthiness*	$F(3,194) = 11.31$	0.14	< .001
Physical Health*	$F(3,194) = 27.12$	0.29	< .001
Mental Health	$F(3,194) = 2.06$	0.02	.02
Age*	$F(3,194) = 94.43$	0.59	< .001
Uncomfortable	$F(3,194) = 3.44$	0.04	.05

* - Significant after correction

Table 5. Main effects and interactions for significant rating models					
Model	Predictor	Estimate (β)	Standard Error	t value	*p*-value
Masculinity	RCC	-3.46	3.31	-1.05	.296
	TICC*	16.34	3.34	4.89	< .001
	RCC X TICC*	40.96	4.70	8.70	< .001
Femininity	RCC	2.38	3.40	0.70	.484
	TICC*	-20.02	3.43	-5.83	< .001
	RCC X TICC*	-35.04	4.83	-7.26	< .001

Trustworthiness	RCC*	15.80	3.72	4.25	< .001
	TICC	-0.16	3.76	-0.04	.966
	RCC X TICC	-0.82	5.29	-0.16	.877
Physical Health	RCC	7.22	3.62	2.00	.05
	TICC*	-20.57	3.65	-5.63	< .001
	RCC X TICC*	22.13	5.14	4.30	< .001
Age	RCC*	-3.72	1.21	-3.08	.002
	TICC*	14.73	1.22	12.06	< .001
	RCC X TICC*	-12.85	1.71	-7.48	< .001

* - Significant
RCC = Race Categorization Condition
TICC = Transgender Identity Categorization Condition

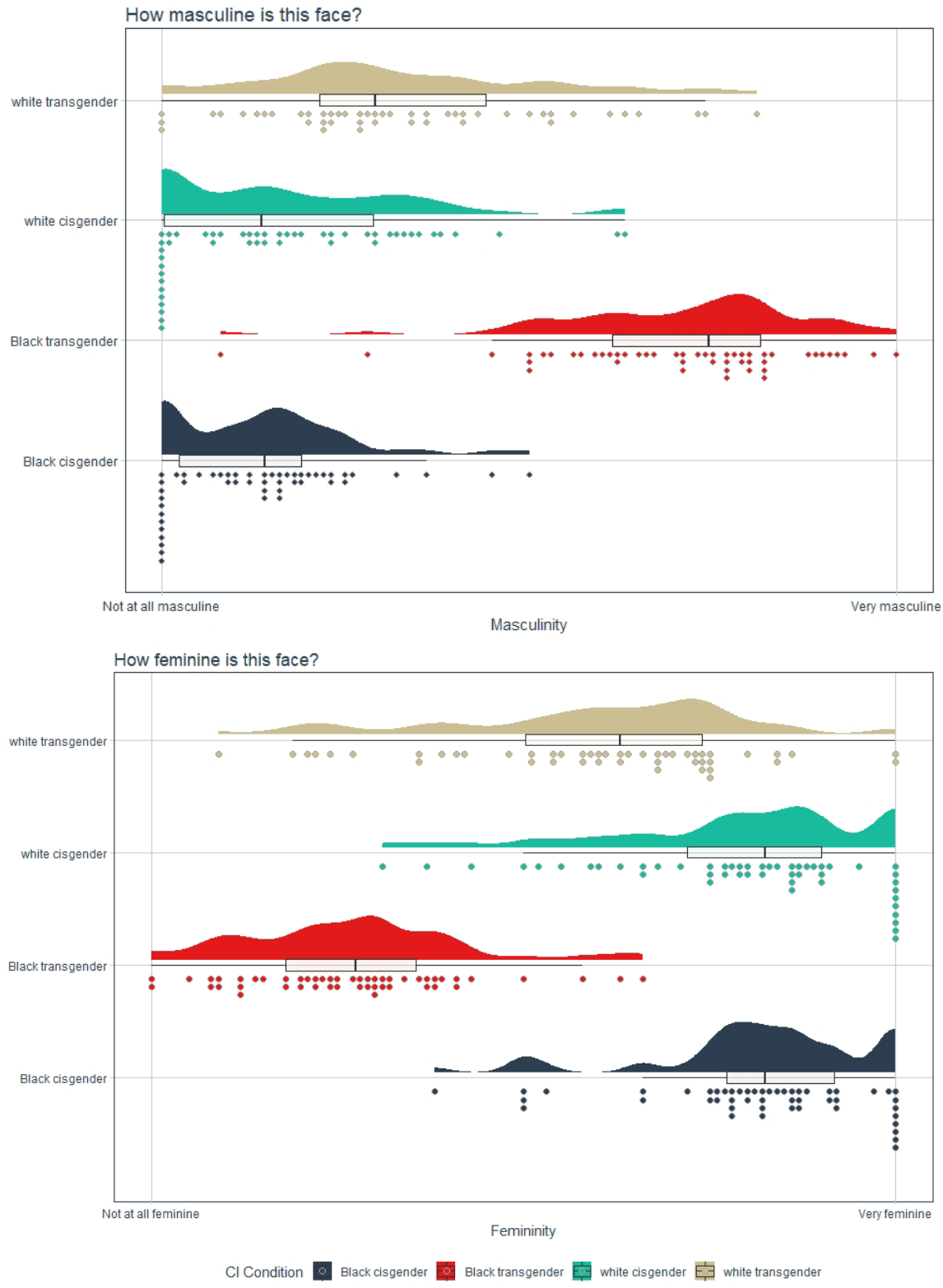


Fig. 5. Masculinity (left) and Femininity (right) ratings based on CI generation phase TICC and RCC. There is a notable significant main effect for TICC and a significant interaction between TICC and RCC.

Discussion

While the initial goal of this study was to create stimuli and examine their appropriateness for use in studies focused on identifiably transgender individuals, these results show that the gap between mental representations and visual perceptions of transgender women is wider, and more nuanced, than expected. Indeed, even within the context of racialized gender perception (e.g., Goff et al., 2008), participants categorized transgender CIs as transgender at rate no higher than chance. While this suggests that these stimuli were not appropriate for study 3, it provides potentially meaningful information in and of itself. Previous research has suggested that memory for ostensibly transgender faces can be directly impacted by the knowledge that a target is transgender (Wittlin et al., 2018). In the case of the present work, however, participants were only provided with the information that the target was a woman instead of being primed to consider the target as transgender or cisgender, which might cause individuals to perceive the target in a cisnormative fashion – that is, participants might be engaging with their preconceptions about what a woman is or is not, and accepting information that confirms and rejecting information that disconfirms those preconceptions (Darley & Gross, 1983). In other words, after considering cisnormativity and proportion of transgender individuals in the overall population, it may make more sense in an individual's mind that the target is a cisgender woman rather than a transgender woman.

Despite this, there were numerous important differences noted between CI faces. Similar to previous results examining cisgender and transgender CIs outside of racialized contexts (Gallagher & Bodenhausen, 2021), the stimuli from both the Black and white transgender categorization conditions were perceived as more masculine and less feminine than their counterparts. Moreover, the results examining the main effects of RCC on gendered perception

aligned with work examining racially-impacted gendered perceptions (Goff et al., 2008), suggesting that faces created under the Black RCC conditions were also perceived as more masculine and less feminine. The current work moves beyond to show the impact that race and gender identity categorization might have on mental representations of individuals, examining the potential intersection of perceptions. While these stimuli might not be reliably categorized into a transgender identity category that is concordant with the categorization condition from the first step of the RC procedure, these results suggest that the TICC did impact overall gendered mental representation and perceptions.

It is important to note some limitations of this study. Firstly, as RC procedures are founded in the concept of getting mental representations of a category of person within a population, CIs that are created from the responses of a particular population will be bounded by that population (Brinkman et al., 2017; Dotsch & Todorov, 2012). If a population, for example, holds the perception of transgender people as dangerous, the CI generated from a transgender focused RC procedure would be more likely to be perceived as dangerous. In the case of the current study, a young, liberal, student-based population might not have the same mental representation as individuals who are older, who are more conservative, or who have stronger negative biases against transgender individuals. In order to examine the impact that the demographic features of populations recruited during the first step of the two-step RC procedure (CI generation phase) has on the visualized mental representations of a "transgender woman," further targeted recruitment is needed. Additionally, the RC procedure has been noted to have the possibility of inflating the likelihood of type I error (Cone et al., 2021). The suggested solution for this is to split the CIs and create multiple CIs per condition to confirm similar responding. Future work examining social perceptions of the mental representations of transgender Black and

white individuals would benefit from such procedures. CIs have been previously noted to have some issues with image quality and image characteristics in that they often contain additional visual noise that does not reflect the face and are only available in black and white (Brinkman et al., 2017, 2019) – these flaws in the procedure may have contributed to the inability of independent raters to categorize faces in alignment with the categories provided to the CI generating participants. Additional procedures using computer generated faces, or faces derived from existent faces in a face database (Krosch et al., 2013) might provide a firmer foundation upon which to select stimuli that are more readily identified as "transgender." Finally, while faces are readily used to identify group membership such as gender and race based on phenotypic traits (Brown & Perrett, 1993; Bruce et al., 1993; Fazio & Dunton, 1997; Quinn & Macrae, 2011), they are only a portion of bottom-up processing for categorization. Additional visual and auditory cues (e.g., body structure, voice recognition, etc.) are used in categorization (As noted in Freeman & Ambady, 2011). Future studies outside of the RC procedure paradigm may be able to examine these additional traits by manipulating body proportions or vocal attributes.

While study 1 generated valuable information, it failed to produce a face which was reliably categorized as transgender. These results suggest a greater than expected amount of complexity around the ability to recognize gender atypical faces as "transgender" – while it may be tempting to believe that one can "always tell," there may be more to transgender identity recognition than meets the eye. In order to examine, and potentially identify a stimulus, outside of the RC paradigm, an additional study using a point of subjective equality framework was deemed necessary.

Study 2 – Stimuli development and validation through use of a Point of Subjective Equality Framework

Given the inability of the RC procedure to produce stimuli that were readily identifiable as transgender, study 2 used an alternate approach based in research examining the point of subjective equality (PSE). The PSE framework finds its basis in step-based methods examining perception of color differences. In early work examining the PSE researchers had participants engage with a series of color projections with wavelengths ranging from 470-510nm (blue to green), while asking participants to identify colors as either blue or green (Bornstein, 1976). Participant responses were then assessed using logistic regression to determine the wavelength of light at which participants were equally likely to identify the color as "blue" or "green" – the PSE. In the last decade, this method has been expanded to explore facial categorization, examining topics from facial animacy to racial hypodescent to perceptions of the self in others as it relates to perceived trustworthiness (Farmer et al., 2014; Krosch et al., 2013; Looser & Wheatley, 2010). In each of these studies, faces are morphed using a step-based method from one category to another. For example, in the work examining hypodescent, Krosch and colleagues (2013) created a total of 110 male Black-white face morphs using a series of paired parent faces that were morphed along an 11-point continuum before having participants undergo a 2IFC task identifying faces as either Black or white. In this case, PSE scores were evaluated based on political ideology, with those who were more conservative being noted as requiring a lower threshold needed to identify targets as "Black" (Krosch et al., 2013).

This method for target identification has some significant advantages over the RC method. First, while these stimuli are not directly drawn from response data from independent

participants, the stimuli lack the excessive visual noise of RC CIs and are able to be in color allowing for clearer perception of the targets. Second, this method allows for the identification of the point at which a stimulus within a morph line is most likely to be identified as transgender, allowing for the opportunity to match transgender classification likelihoods between two or more conditions. Finally, it can provide the opportunity to explore the differences in categorization between conditions (i.e., race-based conditions).

Methods and Materials

Sample

The PSE categorization task recruited racially diverse sample of participants (N =251) through Prolific. Purposeful recruitment methods using Prolific demographic categories were drawn upon in order to increase representation of individuals from often underrepresented race/ethnicity categories. A number of participants were excluded from final analyses due to failures to correctly answer the attention check (n = 3), visual impairment (n=1), and for explicitly noted use of population percentages as a heuristic ("I estimated that the transgender population is a small percentage of the overall population, so I figured most people in the study would be cisgender"; n=1). Additionally, final analyses excluded participants who were deemed as not responding in good faith. These exclusions were based on classifying all stimuli, regardless of race, as transgender (n=6), all stimuli of one of the two race categories as transgender (n=2), and all participants categorizing either all Black morphs or all white morphs as cisgender (n=37). Each of these exclusions are in line with previous literature exploring race-based PSE and categorization (Krosch et al., 2013, 2022). Following exclusions, 152 participants

were retained for analyses. All participants were provided with $.80 as compensation for their time and effort.

Procedure

Participants from a racially/ethnically diverse sample in the United States were recruited using the Prolific participant recruitment platform. Participants were informed that they would be seeing a series of images that were created through the use of a face morphing software program and were asked them to categorize them based on whether they appeared to be cisgender or transgender. In order to make certain that participants understood the differences between the terms "cisgender" and "transgender," participants were provided definitions and examples of transgender and cisgender individuals and then were required to successfully fill in the blanks on three separate sentences discussing transgender women, transgender men, and non-binary individuals. Participants then rated gendered expectations of ostensible individuals, completed a sorting task where they made a total of 44 2IFC decisions (22 stimuli seen twice per participant), and completed a demographic questionnaire including an attention check. The median time for completion of this study was approximately eight and a half minutes, and all participants were provided with $.80 as compensation for their time and effort.

Stimulus Creation

To create the stimulus faces, a total of four unique "parent" faces were identified using the Chicago Face Database (Ma et al., 2015). The Chicago Face Database is ideal for identifying parent faces due to the fact that each of the faces has been categorized and rated by independent raters on a number of dimensions. Parent faces were selected based on self-identified race (2

Black, 2 white), self-identified gender (2 male, 2 female), masculinity and femininity (highest ratings that are concordant with gender identity), and prototypicality. All faces lacked facial hair and were matched based on perceived age.

Once faces were selected, morphs were created using Abrosoft FantaMorph Deluxe 5.0 facial morphing software. This software allows for the morphing of two different stimuli from a range of 100% of one stimulus to 100% of another stimulus. Race-matched male and female faces were morphed along an 11-point continuum ranging from 100% female to 100% male, yielding a total of 22 stimuli for categorization (fig. 6).

Fig. 6. Two morph continuums reflecting Black (top) and white (bottom) face morphs ranging from 100% male to 100% female.

Categorization task

Prior to completing the categorization task, participants were informed that they would be seeing a series of images that were created through the use of a face morphing software program. Participants were further informed that these images might vary based in their gendered appearance, and their task was to determine whether each face looked more like a "cisgender" face or more like a "transgender" face. Participants then completed a 2IFC categorization task where they saw the stimuli and were asked to categorize them as being either "transgender" or "cisgender." Participants saw each of the stimuli twice, and all forty-four trials were presented in a randomized order.

Expected masculinity and femininity

Participants were also asked to rate their expectations of the masculinity and femininity of five categories of individual: cisgender women, transgender women, transgender men, cisgender men, and nonbinary people. All ratings were conducted on a 101-point slider scale (0 = Very masculine; 100 = Very feminine).

Quality Check, Attention check, and Demographics

Participants completed the same quality and attention checks listed in study 1a. Participants also completed the ATTW scale noted in study 1a. In the context of this study, this scale had excellent internal reliability ($\alpha = 0.98$).

Participants also answered questions related to their age, gender, transgender identity status, work status, race/ethnicity, sexual orientation, political orientation, and household income. Finally, participants were asked to provide any additional feedback that they might have.

Statistical analysis plan

In order to make a determination about the most appropriate stimulus for each race-based category, categorizations averages were plotted and were visually assessed to identify potential points at which the categorization average crossed the .5 threshold. Once potential images were identified, one sample t-tests were conducted to determine whether the likelihood of categorization was greater than chance. Images were then matched based on categorization to make certain that selected images were equally likely to be categorized as "transgender."

Further, participant responding patterns based on target composition and target race were modeled using a quadratic regression approach. This allowed for the assessment of model

characteristics using an ANOVA test to examine whether the addition of a race variable yielded a significantly better fit. Based on the previous study, it was predicted that the more complex model would yield a better overall fit with the data. As this test only allows for an examination of model variability, no specific directionality can be hypothesized. While individual responding patterns were considered in order to examine variability in PSE thresholds, the limited number of stimuli and the nature of participant responding prevented the majority of participants (n= 109) from having individual PSE thresholds.

Finally, a series of correlations were used to examine the relationships between political orientation, transphobia, and the gendered expectations of transgender and cisgender individuals. Gendered expectations were re-coded for binary anticipated targets such that higher scores reflected an expected concordance between the targets gender and participant expectations of gendered appearance or attitudes. While all individuals may vary in expression of masculinity or femininity, limited schema likely exist along this somewhat arbitrarily binary scale; as such, these scores remained unaltered. All data and code is available on the OSF (https://osf.io/yuq9x/).

Results

Sample characteristics

Overall, the sample population reflected a relatively diverse background with fewer than half of participants self-identifying as white and non-Latine (n= 73; 48.03%), male (n=74; 48.68%) or female (n=73; 47.37%). Nearly two-thirds of the participants self-identified as heterosexual (n = 106; 69.74%), and the vast majority did not identify as transgender (n = 142; 93.42%). While the mean political orientation scores (M=32.70, SD = 26.81) reflected a more

liberal/left leaning sample, the range and standard deviation suggests that there may have been more variability than anticipated without purposeful sampling. Importantly, the sample displayed ATTW scores (M = 40.17, SD = 32.08) that reflected more ambivalent attitudes towards transgender women. Complete demographic information can be found in table 6.

Table 6. Demographic characteristics for study 2

Demographic Characteristics (N = 152)		
Age		
	Range	18-80
	M (*SD*)	36.35(*13.89*)
Political Orientation		
	Range	0-100
	M *(SD)*	32.70 (*26.81*)
Household Income ($)		
	Range	0 – 500,000
	M *(SD)*	67,980.03 (*58,961.83*)
Attitudes towards transgender women		
	Range	0 – 100
	M (*SD*)	40.17 (32.08)
Gender, n (%)		
	Man	74 (48.68)
	Woman	72 (47.37)
	Gender Diverse	6 (3.95)
	Nonbinary	4 (2.63)
	Female and nonbinary	1 (0.66)
	Male but deeply questioning	1 (0.66)
Transgender, n(%)		
	Yes	10 (6.57)
	No	142 (93.42)
Sexual Orientation, n (%)		
	Heterosexual	106 (69.74)
	Bisexual	21 (13.82)
	Homosexual, gay, or lesbian	5 (3.29)
	Pansexual	5 (3.29)
	Asexual	3 (1.97)
	Queer	2 (1.32)
	Questioning, Bicurious	2 (1.31)
	None	1 (0.66)
	A gendered category (e.g. female, cisgender)	8 (5.26)

Race/Ethnicity, n (%)		
	White (Non-Latine)	73 (48.03)
	Black	29 (19.08)
	Asian	24 (15.79)
	Hispanic/Latino/Latine	5 (3.29)
	white, Hispanic/Latino/Latine	11 (7.24)
	Black, Hispanic/Latino/Latine	1 (0.66)
	Biracial or Multiracial	7 (4.61)
	Indigenous American	1 (0.66)
	Another identity not listed	1 (0.66)
Employment status, n (%)		
	Employed full or part time	104 (68.42)
	Not employed, but looking for work	18 (11.84)
	Not employed, not looking for work	16 (10.52)
	Student only	9 (5.92)
	On disability	5 (3.28)

Stimulus identification and confirmation

In order to assess whether any individual image exceeded the .5 threshold for categorization when taking into account responding from all participants, responding patterns for each of the stimuli from each race-based target category were plotted using a bar graph (Fig. 6). Initial examination of these graphs indicated that the only Black stimulus that exceeded a mean categorization score of .5 was the stimulus reflecting a 50% male-female morph. Visual examination of the bar graphs for the white stimuli suggested that the best match based in categorization scores to the Black 50% female morph face was likely to be the white 60% female morph face (fig 7).

To determine whether the Black 50% face significantly differed from a categorization threshold of .5, a one-sample t-test examined the categorization of this specific image compared to a population mean of .5. The one-sample t-test indicated a significant difference from .5, $t(303) = -1.84$, $p = .03$. A follow-up independent groups t-test examining whether the white 60% female face morph differed from the Black 50% female face morph suggested no significant

difference between the two, $t(606) = 1.218$, $p = .22$. Taken together, these data suggested that the two images were matched.

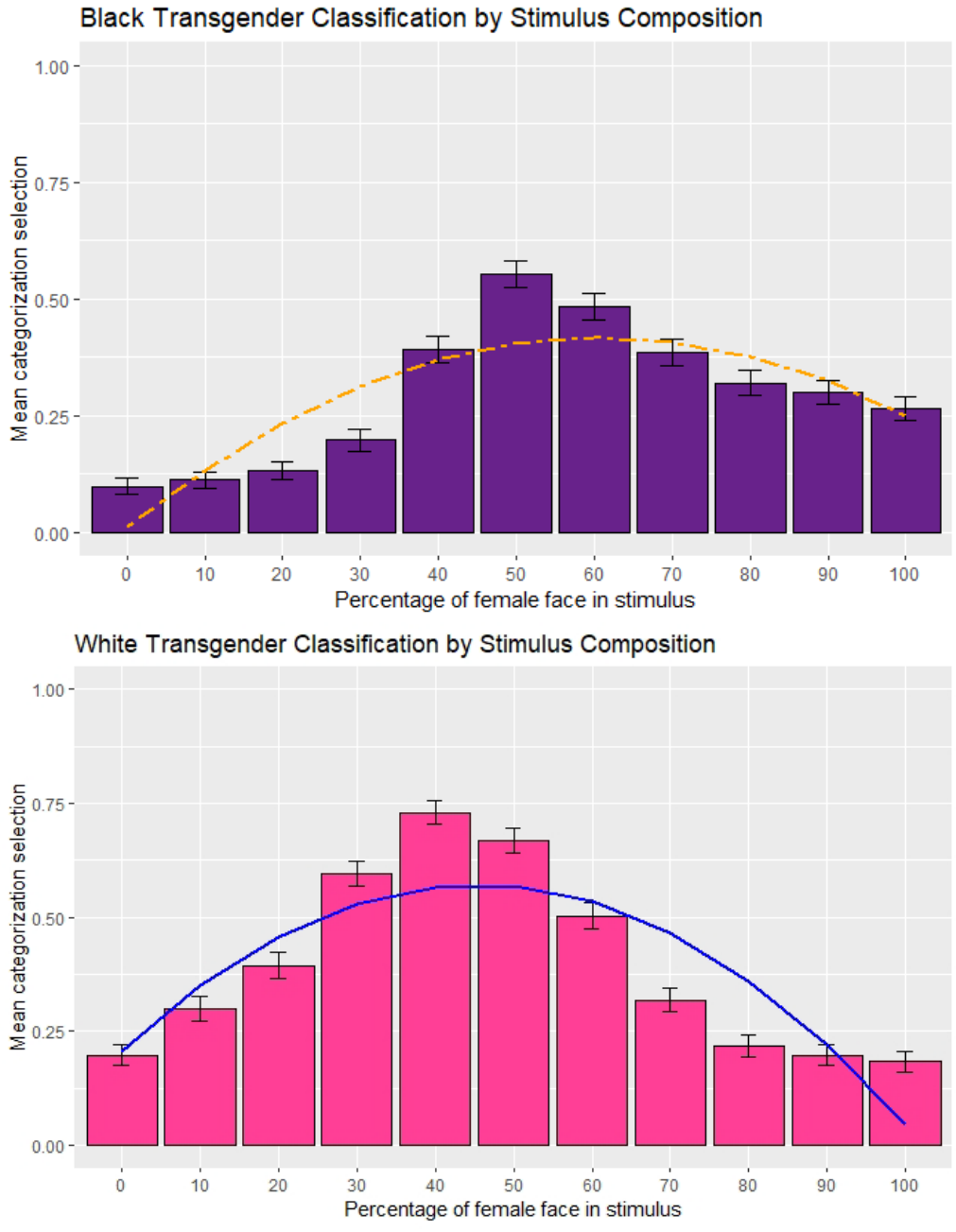


Fig. 6. Categorization for each morphed stimulus in the Black (top) and white (bottom) conditions. Across each bar is superimposed the overall PSE curve.

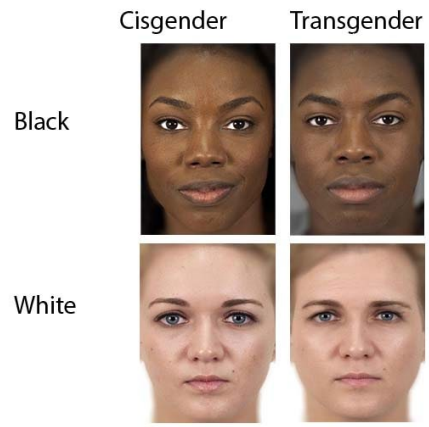


Fig 7. Four faces reflecting Black and white, cisgender and transgender conditions. The "cisgender" faces are comprised of 100% female morph stimuli, while the Black and white "transgender" faces reflect 50% and 60% female morphs (respectively).

Examining the impact of target race on categorization

In order to determine whether overall patterns of responding were significantly different based on target racial category, two nested quadratic regressions were created with one model using *female percentage* (F_percentage) and F_percentage^2 as the explanatory variables, and the other examining interactions of racial categorization with the explanatory variables. The initial model was significant, $F(2, 6685) = 257.9$, $p < .001$, as was the alternate model incorporating race, $F(5, 6682) = 154.8$, $p < .001$. Once these models were created, an ANOVA was conducted to test for goodness of fit using. Results from this analysis were significant, $F(3, 6682) = 80.01$, $p < .001$. These results suggest that race is a significant factor in responding.

While significance in direction and weight based on target racial category cannot be determined based on a test of goodness of fit, the quadratic regression approach allows for an examination of PSE and curve peaks. While these results should be taken with caution, there was variation in PSE points (i.e., the first and second point between a 100% male face and 100%

female face where the quadratic regression crossed the .5 threshold) for each racial categorization of face morphs such that the white face stimuli showed two PSEs (at x = 26 & x = 65, respectively) while Black faces had no PSEs at all. That is, when using a quadratic regression approach, there is no point along the face morph continuum for the selected Black stimuli where participants would be equally likely to categorize a face as "transgender." It is important to note that this does not invalidate the previous results regarding whether the 50% female morph stimulus, but is instead likely the result of the very low level of categorization of the lower percentage female morph stimuli (i.e., stimuli ranging from 0% female-30% female) as transgender. Regardless, the differences in PSEs and the differences in peaks along the white and Black morphed continuums (x = 45 & x = 60, respectively) suggest that, for these particular stimuli sets, white gender ambiguous faces are more likely to be categorized as transgender than Black gender ambiguous faces.

Exploratory assessments of the relationship between political orientation, transphobia, and gendered expectations of transgender and cisgender targets

Expectations, if top-down processing proponents are to be believed, may have an impact on individual perceptions. While these expectations were not included in the previous models, understanding the relationships between individual differences and such expectations may prove useful for future work. To examine these connections, a series of bivariate correlations was conducted. Importantly, strong correlations were noted between political orientation and concordance in gendered expectations for transgender men (r = -0.32) and transgender women (r = -0.22) such that the more conservative/right-leaning a participant was, the greater their expectation of a discordant gendered appearance or expression. Similarly, ATTW was highly

related to expectations of discordance in gendered appearance or expression for transgender women (r = -0.30) and transgender men (r = -0.35). Perhaps unsurprisingly, no significant relationships were noted for the expectations of nonbinary individual. A heatmap of all correlations can be found in figure 8.

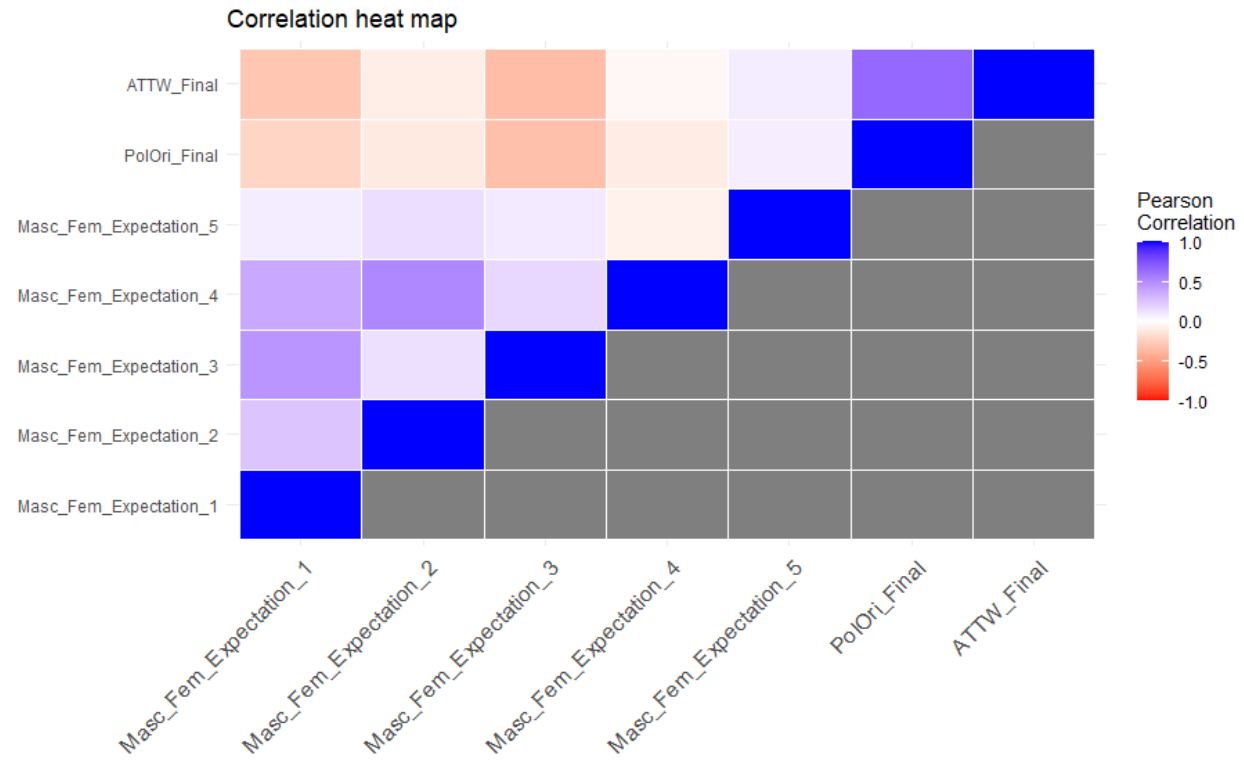


Fig. 8. A correlation heat map reflecting relationships between transphobia, political orientation, and gendered expectations of anticipated targets

Discussion

These results, in conjunction with the results from study 1, reflect the potential uncertainty that individuals have with regards to categorization of transgender individuals. In much of the previous research examining PSE in humans, it has often been through the use of clear cut categories that have numerous exemplars, as in the cases of Black-white face morphs

(Krosch et al., 2013) and of the threshold between the human and inanimate human-like stimuli (Looser & Wheatley, 2010). While transgender exemplars are slowly becoming more common, as can be noted in the increasing familiarity with targets used in implicit association tests involving associations with transgender individuals (see: Axt et al., 2021), these exemplars are few and far in-between.

Interestingly, this particular task showed significant differences based on racial category, but in a way that Black target faces were less likely to be categorized as transgender. This may function in one of two ways. Firstly, while exemplars exists for Black transgender individuals, those who don't perceive themselves as "passing" may avoid the public eye in order to protect themselves (Sherman et al., 2022). Alternatively, it may be that the threshold to be perceived as a "cisgender man" is lower due to gendered perceptions of Black individuals. Finally, this may be the result of these two faces in particular; while the faces selected were each highly rates as masculine or feminine, and high in prototypicality, there may be a factor related to the faces in particular that led to a lower level of transgender categorization regardless of stimulus composition. In order to rule this possibility out, it is necessary to use more face morph continuums in future work.

While this method produced matched images for use in study 3, it, too, has its limitations. PSE tasks are notoriously complex, and often have very low thresholds for tolerance of ostensible "bad faith" or random responding (as can be noted in the exclusions seen in Krosch et al., 2022). Whether this is due to individual perceptions or individual level attention and performance, it is nearly impossible to say. One additional variation on this method that might be conducted would allow participants to view one face after another on a morph line, stopping when a particular stimulus seems to be "transgender." Additionally, as noted, individual

participant responding often lacked the ability to detect individual PSEs. Future research specifically examining this topic might be able to account for this by increasing the number of stimuli in the overall task. Finally, this study only examined categories of "cisgender" and "transgender." While it was outside the scope of this particular study, additional information related to categories of perceived binary gender and overall confidence in categorization might yield a greater understanding of individual level perceptions.

Study 3 – Examining causal antecedents of GRMMIQ through the lens of the Dynamic Interactive Theory of Person Construal

To assess the impact that numerous factors might have on the incorrect causal attribution of gender identity status or medical transition status to a particular acute condition through the lens of the Interactive Dynamic Theory of Person Construal, it is necessary to include manipulations at multiple levels. By manipulating explicit transgender identity status (i.e., specifically stating that the analogue patient is transgender), stereotypes can be evoked, and higher order cognitive processes can be manipulated to potentially impact outcomes. Using the morph images identified by the PSE procedure (study 2), in turn, allows for the manipulation of lower-order cognitive processes through variation in facial cues. Finally, the use of race as a category can provide a look into person perception that relies on established race based schema, while also relying on previous work examining race in the context of health (e.g., Burgess et al., 2006; Sabin et al., 2008). This can provide valuable information about the validity of the Dynamic Interactive Theory of Person Construal while also increasing our understanding of causal antecedents of GRMMIQ. Study 3, therefore, aims to discover if perceived transgender identity status, explicit transgender identity status, and race impact the likelihood of HRT/Gender

identity related misdiagnosis, as well as if these factors impact how trustworthy the physician perceives the patient to be. Aims and hypotheses are noted in the Introduction under the heading "Research Aims and Hypotheses."

Methods and Measures

Sample

Participants consisted of medical students in MD and DO programs, NP students, and PA students in the United States. These programs train individuals to diagnose medical conditions and to enter professions where they will have additional medical authority beyond other degrees and certifications (Zhang & Patel, 2022). Research has suggested that future healthcare providers begin developing their medical biases during their training programs (Burke et al., 2015; Phelan et al., 2015). Such medical biases can impact a provider's perceptions of and beliefs about patients from minoritized populations (e.g., Hoffman et al., 2016), making this an ideal time for understanding this potential bias in medicine.

Students were recruited through a combination of posted flyers at Virginia Commonwealth University, direct and indirect email contact, and some social media. In order to be retained for analysis, participants had to be currently undergoing clinical rotations, be attending a program in the United States, and indicate a willingness to provide their best answers. Additionally, participants, upon completion of the study, had the opportunity to choose to withdraw their data. Of the total number of individuals who attempted to engage in study procedures (N=281), participants were removed for not having begun clinical rotations (n = 149), not attending a US based program (n = 1), and a failure to complete study procedures (n = 10). Furthermore, due to a brief issue regarding online recruitment via social media, some ostensible

respondent data was removed due to poor quality and questionable veracity (n = 18). For example, participants who were removed for questionable veracity may have provided nonsensical diagnoses (e.g., “Benign prostatic huperplasia” which is a misepelling of a condition where one’s prostate is enlarged but not cancerous; Thorpe & Neal, 2003), non-sensical responding to qualitative questions regarding the nature of transgender health coursework (e.g., “Lesbian”), and the indication of programs at universities that do not have such programs (e.g., indicating attendance at a DO program at NYU Grossman School of Medicine, which does not have such a program). Finally, two participants chose to withdraw their data following the debriefing procedures, and one participant who was unable to see the stimulus was also excluded from analyses. The rest of the participants were retained for analyses, creating the total sample (N = 102).

Procedure

Participants who chose to engage with the recruitment materials were redirected to the study which was hosted on Qualtrics. Participants then had the opportunity to read the information sheet, answered a quality check question, completed a CAPTCHA item, and answered three eligibility questions related to program type (i.e., MD, DO, PA, NP, None of the Above), clinical rotation status, and program location. Once participants had completed these procedures, they were randomly assigned to one cell of a 2 (Explicit gender identity status: Cisgender, Transgender) x 2 (Perceived transgender identity status: Cisgender, Transgender) x 2 (Target Race: Black, White) design.

Participants were then presented with a short vignette based on a case study (Elmajee et al., 2017), a blurred image of the ostensible patient, and a brief patient medical record. The patient image and medical records were manipulated in alignment with the condition assigned to

each participant. Participants were provided a limited time period (4 minutes) during which to read the scenario and patient information, provide an assessment of the acute complaint (i.e., diagnosis, perceived primary and secondary contributing factors contributing to acute complaint, and reasoning behind their decisions), and provide any additional questions that they may have for the patient before testing their diagnosis. This particular time constraint (i.e., four minutes) was selected because, on average, physicians in emergency settings are estimated to spend an 7 minutes 31 seconds with patients introduction, medical history review, and physical examination (Rhodes et al., 2004). In this particular case, the evidence from a physical examination were provided, so this average time was slightly reduced to attempt to accurately reflect time with patient without physical examinations. Additionally, previous evidence suggests that decision making based on heuristics that leads to bias in medicine is more likely to occur under significant time constraints (FitzGerald & Hurst, 2017; Stepanikova, 2012). A four-minute period during which to review medical history and provide responses not only reflects a more accurate timeframe based on average time with participants, but also was perceived as being little enough time to elicit pressures faced under significant time constraints. During this period, participants saw a countdown clock that was prominently displayed at the top of the screen. Once four minutes elapsed, if the participant had not completed the assessment, the study auto advanced to the next page. Participants were then asked questions about perceived patient trustworthiness, their comfort working with the participant, their willingness to work with the patient, and feelings of personal competency with regards to working with the patient. Finally, participants were asked questions assessing attitudes towards transgender women and demographic information.

Following completion of the survey, participants were provided the option of selecting one of three charity organizations located in the United States (St. Jude's Research Hospital, The American Civil Liberties Union, and the Gay and Lesbian Medical Association) to which the researchers will donate $2. Participants also received one of two opportunities depending on the period during which they engaged with the study. Participants who completed study materials prior to January 27, 2023 were provided the opportunity to be included in a raffle for one $100 Amazon gift card, while participants who completed study procedures following on this date or later were provided the opportunity to claim one $5 Amazon gift card. The median time it took to complete all study protocols was ten minutes.

Vignette and Conditions

In the presented vignette, the participant is examining an ostensible patient who is complaining of acute left ankle and foot pain. The pain that she is experiencing is getting progressively worse, making it difficult to walk and preventing her from performing her job as a bartender. When asked about more recent activity, she informed the nurse that she had recently begun rock climbing, and that the pain had begun shortly after a recent trip to the rock-climbing gym. The symptoms mentioned in this scenario reflect a fractured ankle sustained from falling and are similar to a case study within the existent literature (Elmajee et al., 2017), where the patient was diagnosed with a closed ankle fracture in conjunction with a ruptured Achille's tendon. The use of a fractured ankle has multiple benefits for examining causal antecedents of GRMMIQ. Not only does an ankle fracture have the benefit of coming from a real participant's experiences with GRMMIQ (Wall et al., 2023), it is also not attributable to either gender identity or use of HRT (Rosen et al., 2019).

Participants were presented with one of four stimuli identified from study 2 (fig. 7) and were told that the image they saw is a slightly blurred picture of the ostensible patient. Participants were also presented with a medical record that only varied by medical history, with those in explicitly transgender condition having a medical history that includes a diagnosis of gender dysphoria. Medication for HRT reflecting concurrent use of estrogen and progesterone (i.e., 2mg Estradiol PO daily, 100 mg Progesterone PO nightly) was be held standard across conditions, as was the patient's heart rate (68 bpm), blood pressure (126/70) height (5'7"), and weight (180 lbs.). Additionally, participants were presented with information from a focused physical exam which was maintained across conditions. Vignettes and medical histories can be found in Appendix B.

Behavioral Measures

Participants were asked four primary questions related to the ostensible patient's acute condition. There were asked to provide a diagnosis, perceived primary factors leading to the acute condition, secondary factors (i.e., other than the primary factors previously listed) that contributed to the acute condition, their reasoning for these factors, and any additional questions that they would like to ask. All responses were qualitative in nature (i.e., free response), and participants could choose how much or how little information to provide during the limited time period.

Behavioral data coding

With the exception of the diagnosis response, all participant responses were coded for the presence or absence of two primary constructs and two secondary constructs. The primary

constructs of interest were gender-related medical misattribution and invasive questioning, while the secondary constructs were BMI/obesity and gender identity. All data were coded by two independent coders with disagreements being resolved by a third coder.

Gender-related medical misattribution was coded based on the presence of explicit or indirect mention of HRT as a causal factor for the acute complaint (2 = Perceived causal factors definitely related to gender identity/HRT, 1 = Perceived causal factors possibly related to gender identity/HRT, 0 = Perceived causal factors definitely unrelated to gender identity/HRT). In one example of this coding, if a participant provided an answer such as "the ankle fracture is likely the result of lower bone mineral density" with explicit mention of gender identity, HRT, or components of HRT, medical misattribution would be coded as definitely related to gender identity/HRT (2). Such an explanation without explicit mention of gender identity, HRT, or components of HRT would be coded as a perceived causal factor that is possibly related to gender identity/HRT (1). However, if participants indicated concerns about bone mineral density due to the patient's BMI or due to weight, medical misattribution would be coded as being definitely unrelated to gender identity/HRT (0). While the nature of the relationship between bone mineral density and BMI is more complicated than previously thought (Hou et al., 2020), the patient's weight could be perceived as causing bone density issues rather than her gender identity or medical transition. The examples of bone density noted above would coded as such due to incorrect beliefs about bone density problems in transgender women that are rooted in previous work that has made comparisons between transgender women and cisgender men (e.g., T'Sjoen et al., 2009). Moreover, while loss of estrogen from menopause (including early onset menopause) is linked to a decrease in bone mineral density (Greendale et al., 2012; Nakamura et

al., 2007), use of hormone replacement therapy counteracts those effects rather than exacerbate them (Gambacciani et al., 2001; Papadakis et al., 2016; Sullivan et al., 2016).

Invasive questioning, defined as unnecessary questions about the patient's HRT or gender identity, is coded as the presence or absence of questions related to the patients HRT (1 = The participant explicitly mentions asking questions about the patient's HRT, 0 = No explicit questions about the patient's HRT). Obesity/BMI was coded based on the explicit presence or absence of mentions of the ostensible patient's weight or BMI, or mentions of the patient being "obese" or "overweight" (1 = The participant explicitly references the patient's weight, 0 = No explicit reference to the patient's weight).

Independent raters were undergraduate research assistants at Virginia Commonwealth University who were provided training that aided them in understanding and identifying potential indicators of a gender identity or HRT based causal attribution, as well as invasive questioning and mentions of BMI. Additional participant instructions outside of the context of the training sessions can be found in Appendix B. A third coder resolved all discrepancies.

Perceptual Measures

Participants rated patient trustworthiness on a 0-100 scale (0=Completely Untrustworthy, 100 = Completely Trustworthy). Exploratory measures were assessed on a similar 101-point scale and included participants' willingness to work with the patient, participants' comfort working with the patient, and the participant's perceived competency (adapted from Schäfer et al., 2016).

Demographics and individual difference measures

Participants completed the same quality and attention checks listed in study 1a. Participants also completed the ATTW scale noted in study 1a. In the context of this study, this scale had excellent internal reliability ($\alpha = 0.98$).

Participants were asked to indicate their age, gender, racial/ethnic identity, sexual orientation, political orientation, and transgender identity status. With some exceptions, participant demographics were collected in the same manner as in study 1. While political orientation was measured in a similar way as study 1, political orientation was anchored with the terms "Political Left" and "Political Right" rather than "Extremely Liberal" and "Extremely Conservative" (i.e., 0 = Political Left, 100 = Political Right) on three measures assessing overall political orientation, political orientation on social issues, and political orientation on economic issues (adapted from Carney et al., 2008). This decision was primarily driven by some work currently under review suggesting that those who identify as "Leftist" do not see themselves as "extremely liberal," but those that are liberal may still see themselves as politically left (Alto et al., Under Review; Zmigrod, 2020).

Gender and transgender identity status was assessed using the three-question method (Beischel et al., 2022). The three-question approach to gender identity assessment permits individuals to self-identify their gender while also allowing participants the opportunity to identify where they stand in relation to transgender/cisgender identity groups and binary/non-binary identity groups. Similar to study 1, free response "gender" was recoded using the 'gendercoder' package in R (Beaudry et al., 2020). While the three-question approach to gender assessment allows for the coding of binary and non-binary identities outside of the free-response

gender format, this category was assessed in combination with the recoded free-response gender category so that those who identified as “non-binary” and within a “man/woman” framework were categorized as “gender diverse.” This was done in order to maintain similar demographic categorizations across studies.

Other demographic variables were recoded using similar methods to study 1. All data and materials are available online (https://osf.io/x69bm/).

Planned Statistical Analyses

Multiple linear regression models were used to explore the impact that race, visually perceived transgender identity status, and explicit transgender identity status had on incidence of invasive questioning and medical misattribution, as well as perceived trustworthiness and other exploratory perceptual measures. Main effects, as well as two- and three-way interactions, were explored, with ATTW incorporated as a covariate to account for the potential confounding impact that endorsed transphobia might have in diagnosis. While logistic regressions were considered for these analyses, recent work has suggested that linear regression may prove to be a more useful means to assess causality, while also being more understandable than the odds ratio outcomes that come from using logit based modelling (Gomila, 2020). Standard frequentist measures of statistical significance (i.e., *p values*) using Holm-Bonferroni correction were used to assess significance. An *a priori* power analyses conducted with G*Power 3.1.9.7 suggested a sample size of 103 was necessary for achieving a power of .8 for effect sizes as low as .15 when examining all 7 predictors (main effects of explicit transgender identity status, perceived transgender identity status, and race, all two- and three-way interactions, and one random effects

term reflecting individual participants). All data and code are available on the OSF (https://osf.io/x69bm/)

Results

Sample characteristics

Of the 102 individuals retained for analysis, participants were relatively young (M = 27.18, SD = 2.89), majority white, non-Latine (n = 59; 57.84%), and mostly self-identified as women (n = 81; 79.41%). Nearly three-quarters of the sample were currently attending MD programs (n = 73; 71.57%), and most had few negative opinions about transgender women as defined by ATTW scores (M = 11.67; SD = 19.73). Overall, the sample generally self-identified as politically left (M= 18.12, SD = 19.87). Complete demographic information can be found in table 7.

Table 7. Demographic characteristics for study 3		
Demographic Characteristics (N = 102)		
Age		
	Range	23-39
	M (*SD*)	27.18 (*2.89*)
Political Orientation		
	Range	0-83
	M *(SD)*	18.11 (*19.87*)
Attitudes towards transgender women		
	Range	0 – 90.92
	M (*SD*)	11.67 (*19.72*)
Program of study, n (%)		
	MD Program	73 (71.57)
	PA Program	18 (17.65)
	NP Program	11 (10.78)
Gender, n (%)		
	Woman	78 (76.47)
	Man	18 (17.65)
	Gender Diverse	6 (5.88)

	Nonbinary woman	3 (2.94)
	Nonbinary	2 (1.96)
	Genderqueer	1 (0.98)
Transgender Categorization, n(%)		
	Cisgender	98 (96.07)
	Transgender	3 (2.94)
	Neither cisgender, nor transgender (Genderqueer)	1 (0.98)
Sexual Orientation, n (%)		
	Heterosexual	66 (64.71)
	Bisexual	16 (15.69)
	Queer	4 (3.92)
	Homosexual/Gay/Lesbian	3 (2.94)
	Pansexual	2 (2.94)
	Asexual/Demisexual	2 (2.94)
	enm	1 (0.98)
	A gendered category (e.g. female, cisgender)	3 (2.94)
	Missing	3 (2.94)
Race/Ethnicity, n (%)		
	White (Non-Latine)	59 (57.84)
	Asian	27 (26.47)
	Biracial/Multiracial	7 (6.86)
	Hispanic/Latino/Latine	4 (3.92)
	Black	2 (1.96)
	Middle Eastern	2 (1.96)
	South Asian	1 (0.98)

Medical Misattribution and Invasive Questioning

Overall counts of medical misattribution suggested that nearly one in five participants either directly (n=16; 15.69%) or indirectly (n=4; 3.92%) identified HRT as being a potential antecedent of the acute complaint. Interestingly, far fewer indicated a desire to dig deeper into the question of the ostensible patient's history with HRT, with fewer than one in ten engaging in invasive questioning (n=9; 8.82%).

Two linear mixed models were conducted to examine the influences of gender typicality, explicitly noted transgender identity status, and target race on each of the aspects of GRMMIQ. The multiple linear regression was non-significant for invasive questioning, $F(8,93) = 1.629$, $p =$

0.13, suggesting that, under these circumstances, none of these predictors or their interactions yielded a greater likelihood of participants engaging in invasive questioning. The multiple linear regression assessing medical misattribution, similarly, reflected non-significant results, $F(8,93) = 1.518$, $p = 0.16$. An additional follow-up analysis examining only cases where HRT was explicitly noted as a potential causal antecedent indicated results nearing significance, $F(8, 93) = 1.806$, $p = 0.086$. Coefficients for the invasive questioning model, potential medical misattribution, and explicit medical misattribution are noted in tables 9.

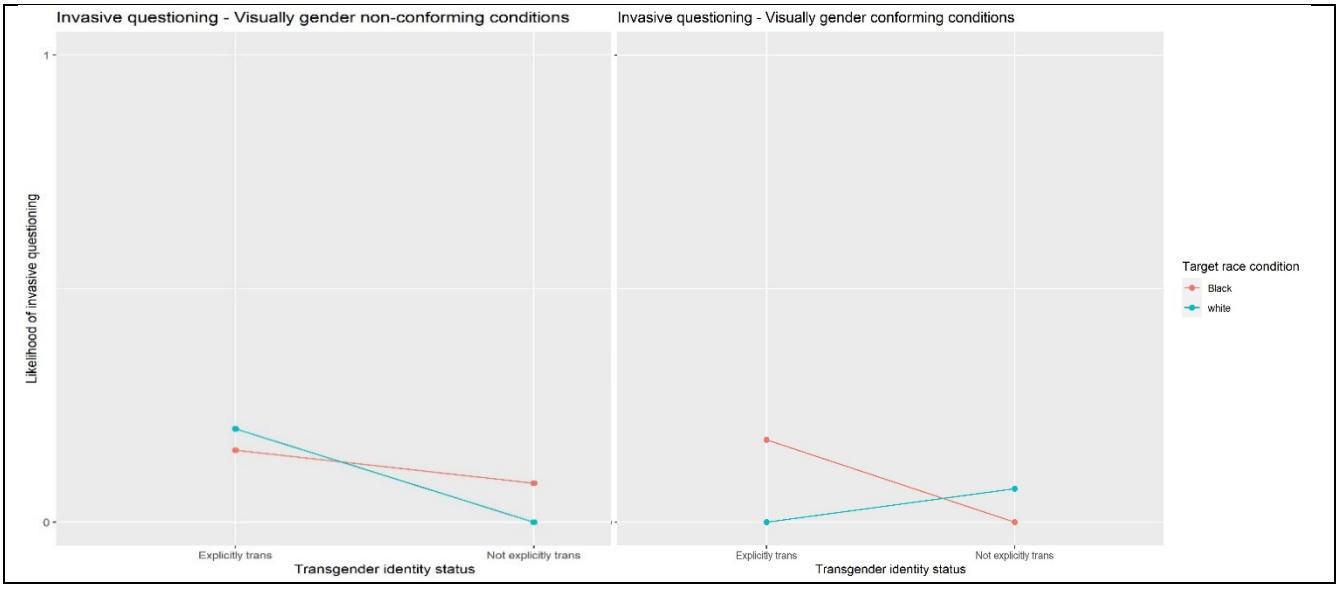
Post-hoc power analyses conducted through G*Power 3.1.9.7 suggested that there may have been too little power to effectively assess the impacts within the 2x2x2 factorial design for each of these outcome variables (Faul et al., 2009). The invasive questioning outcome, for example, had a final power of .76 for the final effect size of $f^2 = 0.14$, while the medical misattribution outcome had a final power of .72 for the final effect size of $f^2 = 0.13$.

Table 8. Coefficients for main effects and interactions for invasive questioning, potential medical misattribution, and explicit misattribution models

Model	Predictor	Estimate (β)	Standard Error	t value	*p*-value
Invasive Questioning	Race	0.06	0.06	1.08	.28
	Perceived transgender identity status	0.03	0.06	0.70	.48
	Explicit transgender identity status	0.11	0.06	2.07	.04
	Race X Perceived transgender identity status	-0.04	0.11	-0.36	.71
	Race X	0.10	0.11	0.94	.35

	Explicit transgender identity status				
	Explicit transgender identity status X Perceived transgender identity status	0.05	0.11	0.43	.67
	Race X Explicit transgender identity status X Perceived transgender identity status	-0.38	0.22	-1.69	.09
Potential Medical Misattributions	Race	0.12	0.15	0.82	.41
	Perceived transgender identity status	0.07	0.14	0.52	.60
	Explicit transgender identity status	0.23	0.15	1.61	.11
	Race X Perceived transgender identity status	-0.10	0.29	-0.35	.72
	Race X Explicit transgender identity status	0.31	0.29	1.06	.29
	Explicit transgender identity status X Perceived transgender identity status	-0.54	0.29	-1.85	.06
	Race X Medical history X Gender Typicality	-0.88	0.58	-1.50	.13
Explicit Medical	Race	0.11	0.07	1.49	.14
	Perceived transgender identity status	0.03	0.07	0.47	.64
	Medical history	0.09	0.07	1.35	.18
	Race X	-0.04	0.14	-0.29	.77

Misattributions	Perceived transgender identity status				
	Race X Explicit transgender identity status	0.21	0.14	1.45	.15
	Explicit transgender identity status X Perceived transgender identity status	-0.31	0.14	-2.20	.03
	Race X Explicit transgender identity status X Perceived transgender identity status	-0.35	0.28	-1.22	.22



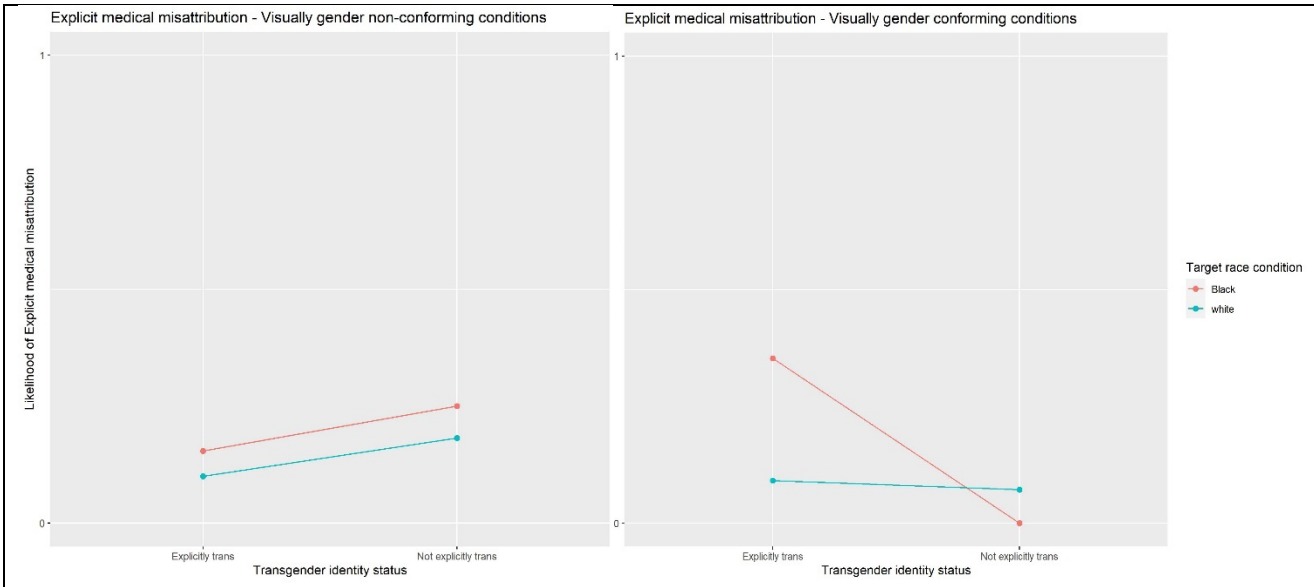
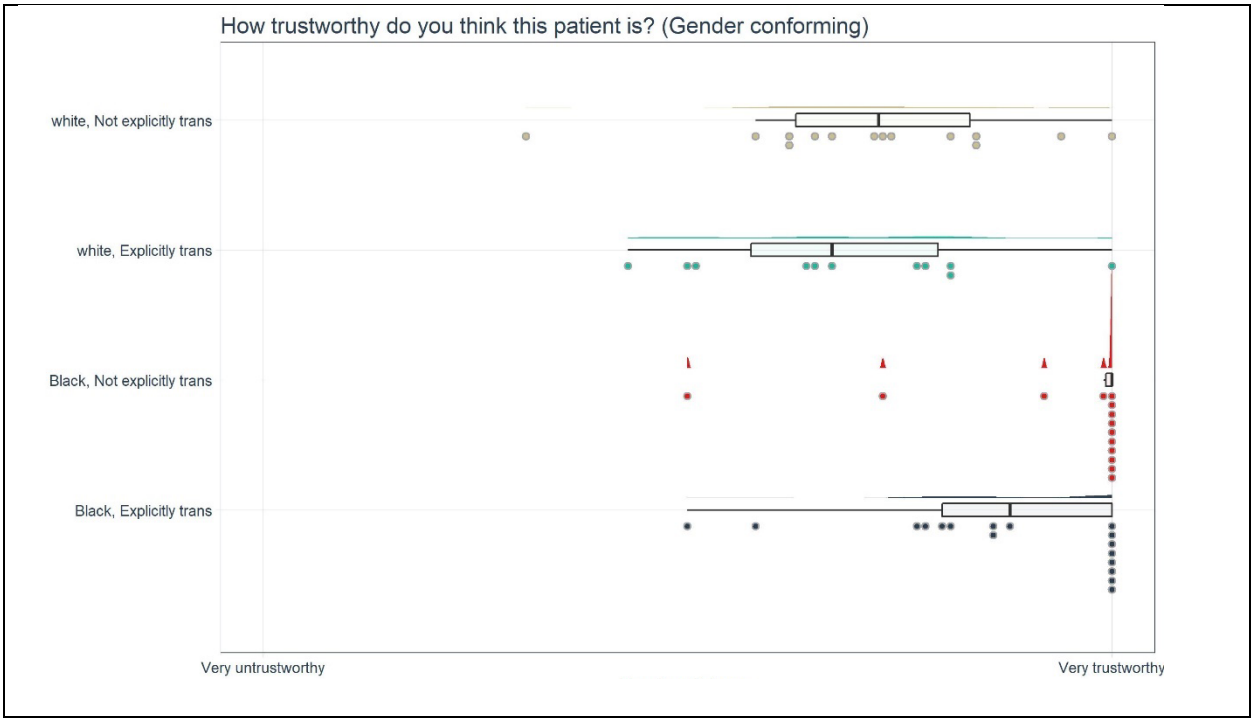


Fig. 9. Likelihood of invasive questioning (top) and explicit medical misattribution (bottom) for the visually gender-nonconforming (left) and visually gender conforming (right) conditions.

Participant perceptions

A similar approach was taken to assessing participant perceptions of the ostensible patient. Multiple linear regressions were used to analyze the impacts of target race, gender typicality, and explicit transgender identity status on the participants anticipated comfort working with the patient, anticipated competency in working with the patient, willingness to work with the patient, and perceptions of the patient's trustworthiness. The anticipated comfort model was not significant, $F(8, 93) = 1.74$, $p = .10$. Similarly, the model for anticipated competency was non-significant, $F(8,93) = 1.40$, $p = .21$, as was the model exploring the participants willingness to work with the patient, $F(8, 93) = 1.71$, $p = .11$. The model for perceived patient trustworthiness, however, was significant, $F(8,93) = 3.22$, $p = .002$. This effect, however, was primarily driven by a significant main effect of race, $\beta = 21.76$, $p < .001$, such that targets who

were Black were perceived as more trustworthy than white targets (fig 10). Additional data visualization can be noted in Appendix C.



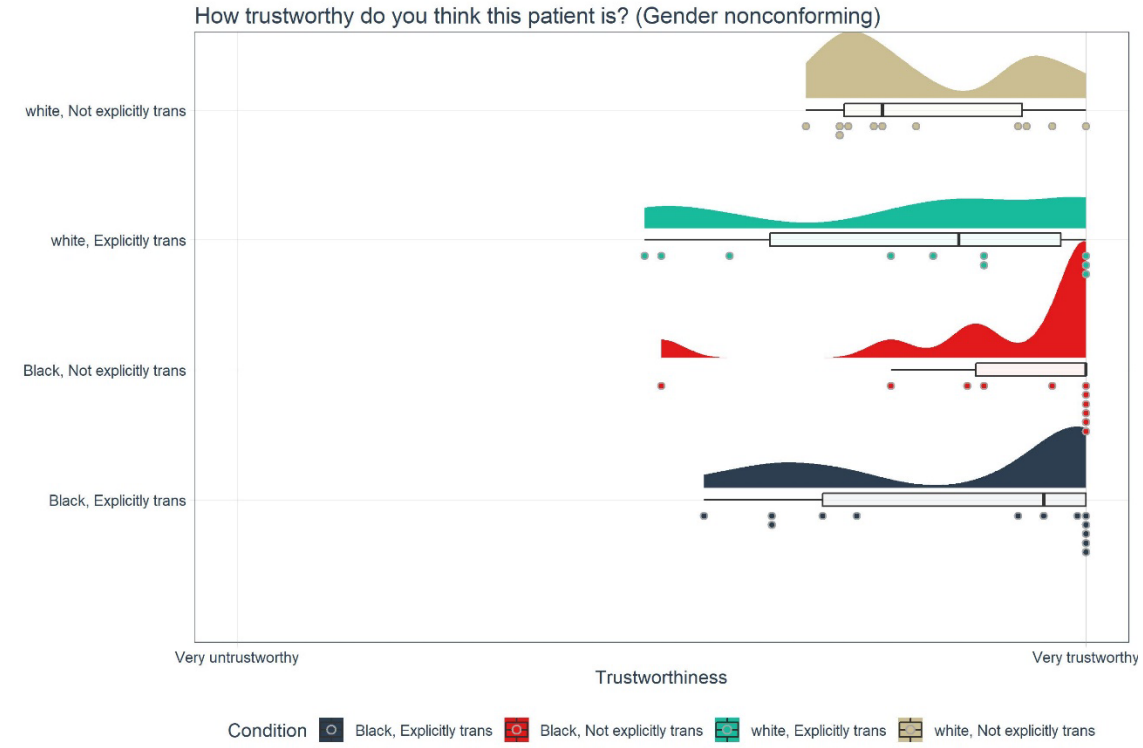


Fig 10. Raincloud plot representing perceived patient trustworthiness in visually gender conforming (top) and non-conforming (bottom) conditions. It is important to note that the visualization of the distribution (i.e., the half violin plot) in the visually gender conforming condition varies from that in the visually gender non-conforming condition due to the limited variability (range: 50-100; median = 100) in the Black, Not explicitly trans condition.

Discussion

Study 3 sought to explore how perceived transgender identity status, explicit transgender identity status, and target race/ethnicity impacted aspects of GRMMIQ and perceived patient trustworthiness. Overall models for these outcomes suggested that these variables did not predict either invasive questioning or potential medical misattribution; however, a follow up model exploring *explicit* medical misattribution trended towards significance. The results presented in this study yielded a more complicated picture of the GRMMIQ phenomenon than initially proposed. While models for invasive questioning and medical misattribution were non-

significant, overall rates of medical misattribution were relatively high, with nearly one in five participants indicating some potential link between HRT and the acute injury. The current work attempted to extend on previous mixed methods work examining GRMMIQ in transgender populations (Wall et al., 2023) by examining potential causal factors of GRMMIQ from a standardized scenario that included ostensibly cisgender "patients." It is important to note that despite a lack of the explicit gender dysphoria diagnosis in the cisgender analogue, some participants still indicated the possibility that HRT was a potential causal factor for the acute complaint. Interestingly, the overall proportion for individuals who asked invasive or unnecessary questions was smaller than in much of the previous research (James et al., 2016; Wall et al., 2023). However, this may have been a function of the nature of the coding (i.e., coding only for explicit questions about HRT) and the fact that this study included ostensibly cisgender individuals; in previous work, many of the unnecessary and invasive questions asked by healthcare providers extended beyond the medical and biological, and into the personal and interpersonal. For example, one participant in this previous work spoke of a healthcare provider who asked if they "didn't accept [their] 'Hispanic ness' or if [their] family was accepting of [their] decision to be transgender" (Wall et al., 2023). The context of this particular study, while useful in exploring topics related to the medical misattribution aspect of GRMMIQ, was not necessarily as effective in eliciting more nuanced possibilities of the invasive questioning.

It is important to note that, while the primary analyses of interest were not statistically significant, this may be a question of power rather a lack of true effect. As noted in the results, each of these outcomes was ultimately underpowered for the noted effect sizes. It can be similarly noted that the lack of significant effects among most of the patient perception variables may have been the result of a lack of power rather than a lack of true effect. Moreover, it must be

noted that the results of the perceived patient trustworthiness, which was statistically significant, must be interpreted with caution. As is, this rating may be the result of either of the two aspects of socially desirable responding – that is, participants in the Black conditions may have inflated their reported perceptions on patient trustworthiness in order to either maintain a more positive self-perception or in order to suppress the outward perception of less "socially acceptable" ideas or beliefs (Paulhus, 1984).

General Discussion

Over the course of three studies, the current work examined mental representations and perceptions of ostensibly transgender individuals, while extending these perceptions to examine potential antecedents of the GRMMIQ phenomenon. Study 1 examined mental representations of transgender and cisgender, Black and white women. Similar to other work examining mental representations and perceptions of transgender individuals (Howansky et al., 2020; Wittlin et al., 2018), transgender women CIs were perceived as less gender typical (i.e., more masculine and less feminine) than cisgender CIs. Further, the significant interactions between race and transgender identity status align with the work exploring gendered perceptions based in race while highlighting the importance of future work examining the intersections of race and transgender identity status in person perception research. Despite these effects, as well as the significant interaction for TICC and RCC in the transgender/cisgender categorization task, overall categorization for ostensibly transgender faces as transgender did not significantly exceed chance and, in the case of the white transgender face, was significantly *lower* than chance. There are several potential explanations for these findings. For example, this might be reflective of difficulties in categorization of cisgender and transgender faces – that is, either a lack of

examples of transgender individuals in the public eye or the limited target-level perceptual factors (e.g., body, voice) might have impacted how easy or difficult it was to categorize faces concordantly with the TICC. On the other hand, this may be more reflective of individual level difficulty in categorizing transgender individuals as transgender. While the schema reflecting transgender women might reflect higher levels of masculinity than cisgender women (Howansky et al., 2019, 2020; Wittlin et al., 2018), such schema might not be as readily available when categorizing target faces – that is, it is possible that individuals might not be able to "always tell" whether a person is transgender or not.

To examine the question of actual categorization, while also identifying potential targets for study 3, study 2 used a PSE approach to examine likelihood of transgender categorization across multiple digitally morphed stimuli. While many of the previous studies examining person perception through a PSE approach were able to assess individual-level PSE score, the current study displayed mixed individual-level interpretability. While some previous work engages in more strict exclusion criteria in order to reduce the likelihood of uninterpretable PSE values (e.g., removing participants who identify more than 50% of one set of 100% white faces as Black; Krosch et al., 2022), the nature of the transgender/cisgender categorization in the context of a series of male/female face morphs prevents such exclusions. Additionally, it is possible that with greater number of participants or a higher number of participant level categorizations, there may have been more individually calculable PSE values. Despite this, when assessing the nature of the group level quadratic regressions and taking into context study 1, a number of interesting patterns emerge. First, as in study 1, study 2 showed a significant impact of race on categorization. However, unlike in study 1, this categorization indicated a lower overall likelihood of transgender categorization for Black faces. This may be due to the nature of the

stimuli, as these face morphs were digitally created from faces in a normed face database while the stimuli from study 1 were created in an approximation of the mental representations of Black and white, cisgender and transgender women. Secondly, this may be the function of how the questions towards the participant were phrased – study 1 asked participants whether the *woman* was transgender or cisgender, while study 2 simply asked whether each stimulus *looked* cisgender or transgender. Such minimal variability in the question itself in study 2 allowed for an examination of the conditions under which stimuli were perceived as more gender ambiguous, and thus more likely to be perceived as transgender, but also prevented a clear understanding of whether participants were perceiving each target stimulus as male, female, or nonbinary. Taking these two sets of results into account, it becomes clear that categorization of individuals based on their faces is much more nuanced than might be expected.

Finally, while the results of study 3 were inconclusive, it is important to note that medical misattribution and invasive questioning was noted in participant behaviors. While these data failed to successfully identify causal pathways leading towards either aspect of GRMMIQ, this does not suggest that medical misattribution or invasive questioning is not existent, nor even that there is a lack of effect of the presented predictors on medical misattribution and invasive questioning. Instead, the presented results may reflect one of a number of potential weaknesses Maof the overall study design. First, the post-hoc power analyses suggested that there may have been insufficient power to detect an effect. Additionally, there is the strong possibility that these manipulations may not have been strong enough to fully elicit either aspect of GRMMIQ. While the current work attempted to manipulate bottom-up perception by way of a visual stimulus, facial perception is only one single pathway by which individuals as categorized. Indeed, the specific facial stimuli used in the “perceived transgender” conditions were only categorized as

transgender approximately 50% of the time. Moreover, the complicated nature of the three-way interaction may have obscured some of the existent effects. When taking into account the complicated nature of transgender groups categorization and recognition noted in studies 1 & 2, the pattern of effects by condition in study 3 may, indeed, reflect a more dynamic and interactive pattern of factors leading to the endorsement of medical misattribution. That is, the complex nature of individual "patient" characteristics may have varying effects on the likelihood of endorsement of medical misattribution by future healthcare providers and, by extension, current healthcare providers. However, additional factors that have been noted to be related to perceptions of transgender individuals, such as the belief that individuals within particular gendered/sexed categories are fundamentally the same (i.e., gender essentialism ; Gallagher & Bodenhausen, 2021), may also impact individual perceptions and the possibility of endorsement of either aspect of GRMMIQ. Taken together, the results from all three studies show a much more complex picture of not only perception and categorization of TGD individuals, but also of GRMMIQ more generally.

Two primary hypotheses were presented at the beginning of the current work. First, it was hypothesized that ostensible patients who are explicitly said to be transgender, are perceived as being transgender, and are Black (and therefore a member of a racial minority group) would have a greater likelihood of medical misattribution, and second that similarly bounded ostensible patients would be perceive as less trustworthy than those who were not minoritized. The first hypothesis was not supported; however, this may have been due to a lack of power rather than a lack of real effect. The second hypothesis was not only not supported but was noted to have higher levels of perceived trustworthiness for ostensible patients who were Black. This may have

been the result of socially desirable responding, so future work examining these factors should likely incorporate implicit measures of trustworthiness.

Limitations and Future Directions

Each of the three studies presented had some unique and universal limitations. For example, while studies 1 and 2 drew from more diverse populations, study 3's sample population was more homogenous in that the majority of the sample self-identified as white and as women. These demographic features may have some impact on the interpretability of the results more generally. In particular, there may be variations in both ratings and categorizations across all studies that are based in attitudinal or demographic differences. For example, regional or demographic differences may impact CI generation procedures as they rely on mental representations of transgender women; someone from a rural area of New York may have a different mental representation of a transgender woman than someone from Seattle, Washington. Moreover, as previously noted, study 3 failed to collect enough participants to see smaller effects. At the time of writing, data collection is currently ongoing for study 3 in order to achieve the power necessary to provide meaningful interpretations of the data.

The work presented in studies 1 and 2 reflect a novel approach to not only understanding mental representations of transgender women by racial categories, but also examining the levels of gender non-conformity that is needed to yield a transgender categorization by participants. While these results suggested that targets are not easily, or reliably, categorized as transgender regardless of gendered appearance, such results are limited by the nature of the stimuli – that is, the stimuli were digitally and statistically created instead of real faces. Future work should explore the complexities of facial categorization using actual transgender faces. Additionally, future work could explore how additional factors, such as target voice and body, might influence

these categorizations. While some previous research has indicated that stimulus presentation modality (e.g., static images vs. video) is not a significant predictor of accuracy in the categorization of perceptually ambiguous stimuli, the included studies only incorporated categorization based on religious beliefs, political beliefs, and sexual orientation (Tskhay & Rule, 2013).

Finally, the results presented in study 3 are limited in a number of ways. First, study 3 was limited by the scope of the potential causal factors explored. While each of these factors may influence incidence of GRMMIQ, there are several other factors which may influence either invasive questioning or medical misattribution. Moreover, these results are constrained by the nature of the population, which was overwhelmingly young, liberal, and held positive opinions towards transgender individuals. Future work should explore how these, and other, factors might influence incidence of GRMMIQ in individuals who have completed medical school and are currently practicing emergency medicine. Finally, the current work is bounded by the modality and nature of the manipulations. That is, these vignettes differ from real patient interactions in a number of ways – they relied on static images that were digitially constructed rather than image, videos, or real world-interactions with real people. Future work must strengthen the manipulations presented while also bringing the current study out of a text and unmoving target image and into a more externally valid framework. Such efforts could take the form of a virtual patient paradigm (as has been used to explore topics related to obesity and race; Hirsh et al., 2015; Persky & Eccleston, 2011), a video based paradigm (as used for race and gender bias in Centola et al., 2021), or even into a real-life setting using an in-person standardized patient scenario (Tamblyn, 1998).

Conclusion

Understanding the factors that can lead to inequality in both diagnosis and perceived trustworthiness is an important step forward in realizing equity in healthcare settings. While the current work did not produce significant results, nor did it identify all of the factors that might be involved in the endorsement of GRMMIQ, the use of methods from multiple sub-fields (e.g., standardized patient scenarios, differential diagnosis techniques, social cognition, etc.) has provided an opportunity to examine the complicated nature of categorization of transgender and cisgender individuals, which may, in turn, impact interpersonal interactions in healthcare settings. Once these routes of perception, and how they impact interpersonal interactions, have been identified, there is the possibility of examining and altering them through interventions designed to reduce bias, both explicit and implicit, and to disrupt pathways that lead towards bias in healthcare settings.

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Appendices

Appendix A: Research Participant Information Sheets and Debrief Documents

Study 1a: CI Generation Participant Information Sheet

RESEARCH PARTICIPANT INFORMATION SHEET

STUDY TITLE: Perceptions of Facial Stimuli

VCU INVESTIGATOR: Catherine Wall

Eric Benotsch, PhD.

You are invited to participate in a research study. Your participation is voluntary. You may decide not to participate in this study. If you do participate, you may withdraw from the study at any time. Your decision not to take part or to withdraw will involve no penalty or loss of benefits to which you are otherwise entitled. **It is important that you carefully think about whether being in this study is right for you.**

Why is this study being done?

In this study, we are exploring how individuals perceive different face stimuli.

You are being asked to participate in this study because we are interested in how you and people like you categorize each of these stimuli.

What will happen if I participate in this study?

In this study, you will be asked to take an online survey through Qualtrics. In this survey, you will be asked to categorize individual faces, answer some questions about related opinions, and will be asked to provide demographic information.

The survey should take no more than 6 minutes to complete. In the categorization task, you will be presented with a series of similar faces and will be asked to categorize them as transgender or cisgender. You will then be asked questions that will involve your personal opinions about transgender and gender diverse individuals, as well as demographic information.

What are the risks and benefits of participating?

There are both risks and benefits of participating in research studies. Some of the questions that you may be asked in this study may make you uncomfortable or may ask about topics with relation to transgender individuals that may be triggering for some individuals. You do not have to answer any questions you do not want to answer, and you may choose to stop taking the survey at any time. If you become upset while taking the survey, you may reach out to the study staff and they will give you names of counselors to contact if you'd like to get support in addressing the emotions felt regarding discrimination. Participation in research might involve some loss of privacy, though NO unique identifiers (Name, ID number, Birthdate, Social Security Number, etc.) will be collected from you. The information that you report in the online survey could be used for research studies without additional informed consent. Additionally, the data that you provide will be used to select stimuli for a future study.

You may not get any direct benefit from this study. It is possible that you will find some of the information to be useful.

WILL I BE PAID TO PARTICIPATE IN THE STUDY?

Participants will receive $0.80 as compensation for their time and effort in this study.

HOW WILL INFORMATION ABOUT ME BE PROTECTED?

VCU has established secure research databases and computer systems to store information and to help with monitoring and oversight of research. The information you report in the survey may be kept in these databases but are only accessible to individuals working on this study or authorized individuals who have access for specific research related tasks.

Identifiable information in these databases are not released outside VCU unless stated in this consent or required by law. Although results of this research may be presented at meetings or in publications, identifiable personal information about participants will not be disclosed. In the future, identifiers might be removed from the information s you provide in this study, and after that removal, the information could be used for other research studies by this study team or another researcher without asking you for additional consent.

WHOM SHOULD I CONTACT IF I HAVE QUESTIONS ABOUT THE STUDY?

If you have any questions, concerns, or complaints about this study now or in the future, please contact:

Catherine Wall, (804) 828-0133, WallCS@vcu.edu

Eric Benotsch, PhD., (804) 828-0133, Ebenotsch@vcu.edu

Study 1b: CI Rating Participant Information Sheet

RESEARCH PARTICIPANT INFORMATION SHEET

STUDY TITLE: Perceptions of Facial Stimuli

VCU INVESTIGATOR: Catherine Wall

Eric Benotsch, PhD.

You are invited to participate in a research study. Your participation is voluntary. You may decide not to participate in this study. If you do participate, you may withdraw from the study at any time. Your decision not to take part or to withdraw will involve no penalty or loss of benefits to which you are otherwise entitled. **It is important that you carefully think about whether being in this study is right for you.**

Why is this study being done?

In this study, we are exploring how individuals perceive different face stimuli.

You are being asked to participate in this study because we are interested in how you and people like you rate each of these stimuli on numerous different dimensions.

What will happen if I participate in this study?

In this study, you will be asked to take an online survey through Qualtrics. In this survey, you will then be asked to complete ratings of individual faces, answer some questions about related opinions, and will be asked to provide demographic information.

The survey should take no more than 3 minutes to complete. In the ratings task, you will be presented with four different faces and will be asked to assess them on nine different dimensions. Other questions included in the survey will involve your personal opinions about transgender and gender diverse individuals, as well as demographic information.

What are the risks and benefits of participating?

There are both risks and benefits of participating in research studies. Some of the questions that you may be asked in this study may make you uncomfortable or may ask about topics with relation to transgender individuals that you may be triggering for some individuals. You do not have to answer any questions you do not want to answer, and you may choose to stop taking the survey at any time. If you become upset while taking the survey, you may reach out to the study staff and they will give you names of counselors to contact if you'd like to get support in addressing the emotions felt regarding discrimination. Participation in research might involve some loss of privacy, though NO unique identifiers (Name, ID number, Birthdate, Social Security Number, etc.) will be collected from you. The information that you report in the online survey could be used for research studies without additional informed consent.

You may not get any direct benefit from this study, but the information we learn from people in this study may help us in learning about race and ethnic discrimination in interpersonal relationships both on and offline, the mental health outcomes that exist as a result of such

experiences, and the coping mechanisms that emerging adults engage in. It is possible that you will find some of the information to be useful.

WILL I BE PAID TO PARTICIPATE IN THE STUDY?

Participants will receive $0.60 as compensation for their time and effort in this study.

HOW WILL INFORMATION ABOUT ME BE PROTECTED?

VCU has established secure research databases and computer systems to store information and to help with monitoring and oversight of research. The information you report in the survey may be kept in these databases but are only accessible to individuals working on this study or authorized individuals who have access for specific research related tasks.

Identifiable information in these databases are not released outside VCU unless stated in this consent or required by law. Although results of this research may be presented at meetings or in publications, identifiable personal information about participants will not be disclosed. In the future, identifiers might be removed from the information s you provide in this study, and after that removal, the information could be used for other research studies by this study team or another researcher without asking you for additional consent.

WHOM SHOULD I CONTACT IF I HAVE QUESTIONS ABOUT THE STUDY?

If you have any questions, concerns, or complaints about this study now or in the future, please contact:

Catherine Wall, (804) 828-0133, WallCS@vcu.edu

Eric Benotsch, PhD., (804) 828-0133, Ebenotsch@vcu.edu

Study 2: Stimuli validation through use of a Point of Subjective Equality Framework Information Sheet

RESEARCH PARTICIPANT INFORMATION SHEET

STUDY TITLE: Perceptions of Facial Stimuli

VCU INVESTIGATOR: Catherine Wall

Eric Benotsch, PhD.

You are invited to participate in a research study. Your participation is voluntary. You may decide not to participate in this study. If you do participate, you may withdraw from the study at any time. Your decision not to take part or to withdraw will involve no penalty or loss of benefits to which you are otherwise entitled. **It is important that you carefully think about whether being in this study is right for you.**

Why is this study being done?

In this study, we are exploring how individuals perceive different face stimuli.

You are being asked to participate in this study because we are interested in how you and people like you categorize each of these stimuli.

What will happen if I participate in this study?

In this study, you will be asked to take an online survey through Qualtrics. In this survey, you will be asked to categorize individual faces, answer some questions about related opinions, and will be asked to provide demographic information.

The survey should take no more than 6 minutes to complete. In the categorization task, you will be presented with a series of similar faces and will be asked to categorize them as transgender or cisgender. You will then be asked questions that will involve your personal opinions about transgender and gender diverse individuals, as well as demographic information.

What are the risks and benefits of participating?

There are both risks and benefits of participating in research studies. Some of the questions that you may be asked in this study may make you uncomfortable or may ask about topics with relation to transgender individuals that may be triggering for some individuals. You do not have to answer any questions you do not want to answer, and you may choose to stop taking the survey at any time. If you become upset while taking the survey, you may reach out to the study staff and they will give you names of counselors to contact if you'd like to get support in addressing the emotions felt regarding discrimination. Participation in research might involve some loss of privacy, though NO unique identifiers (Name, ID number, Birthdate, Social Security Number, etc.) will be collected from you. The information that you report in the online survey could be used for research studies without additional informed consent. Additionally, the data that you provide will be used to select stimuli for a future study.

You may not get any direct benefit from this study. It is possible that you will find some of the information to be useful.

WILL I BE PAID TO PARTICIPATE IN THE STUDY?

Participants will receive $0.80 as compensation for their time and effort in this study.

HOW WILL INFORMATION ABOUT ME BE PROTECTED?

VCU has established secure research databases and computer systems to store information and to help with monitoring and oversight of research. The information you report in the survey may be kept in these databases but are only accessible to individuals working on this study or authorized individuals who have access for specific research related tasks.

Identifiable information in these databases are not released outside VCU unless stated in this consent or required by law. Although results of this research may be presented at meetings or in publications, identifiable personal information about participants will not be disclosed. In the future, identifiers might be removed from the information s you provide in this study, and after that removal, the information could be used for other research studies by this study team or another researcher without asking you for additional consent.

WHOM SHOULD I CONTACT IF I HAVE QUESTIONS ABOUT THE STUDY?

If you have any questions, concerns, or complaints about this study now or in the future, please contact:

Catherine Wall, (804) 828-0133, WallCS@vcu.edu

Eric Benotsch, PhD., (804) 828-0133, Ebenotsch@vcu.edu

Study 3: Vignette Study Participant Information Sheet (Initial)

RESEARCH PARTICIPANT INFORMATION SHEET

STUDY TITLE: Rapid diagnosis and patient perception using a standardized patient vignette

VCU INVESTIGATOR: Catherine Wall

Eric Benotsch, PhD.

You are invited to participate in a research study. Your participation is voluntary. You may decide not to participate in this study. If you do participate, you may withdraw from the study at any time. Your decision not to take part or to withdraw will involve no penalty or loss of benefits to which you are otherwise entitled. **It is important that you carefully think about whether being in this study is right for you.**

Why is this study being done?

In this study, we are exploring how medical students perceive and respond to patient complaints when provided a short period of time in which to grasp the circumstances.

You are being asked to participate in this study because we are interested in how you and people like you respond to this situation given the time constraints.

What will happen if I participate in this study?

In this study, you will be asked to take an online survey through Qualtrics. In this survey, you will be provided a short period of time during which you will be asked to read a clinical vignette,

provide a potential diagnosis, and identify some causes that may have contributed to that diagnosis. In addition to the clinical vignette, you will be provided with information about the patient including a brief medical history and a somewhat blurred image. You will also be asked additional questions designed to assess your opinions about the situation, and you will be asked to answer some questions about related opinions and provide some demographic information. The survey should take no more than 10 minutes to complete.

What are the risks and benefits of participating?

There are both risks and benefits of participating in research studies. Some of the questions that you may be asked in this study may make you uncomfortable. You do not have to answer any questions you do not want to answer, and you may choose to stop taking the survey at any time. Participation in research might involve some loss of privacy, though NO unique identifiers (Name, ID number, Birthdate, Social Security Number, etc.) will be collected from you. The information that you report in the online survey could be used for research studies without additional informed consent.

You may not get any direct benefit from this study, but the information we learn from people in this study may help us in learning about factors that might influence diagnoses and health outcomes. It is possible that you will find some of the information to be useful.

WILL I BE PAID TO PARTICIPATE IN THE STUDY?

While you will not be directly paid for your participation, you will be provided the opportunity to select charities that will be donated to by the researchers on your behalf. Additionally, all

participants will be provided the opportunity to enter into a raffle for one (1) $100 Amazon gift card.

HOW WILL INFORMATION ABOUT ME BE PROTECTED?

VCU has established secure research databases and computer systems to store information and to help with monitoring and oversight of research. The information you report in the survey may be kept in these databases but are only accessible to individuals working on this study or authorized individuals who have access for specific research related tasks.

Identifiable information in these databases are not released outside VCU unless stated in this consent or required by law. Although results of this research may be presented at meetings or in publications, identifiable personal information about participants will not be disclosed. In the future, identifiers might be removed from the information s you provide in this study, and after that removal, the information could be used for other research studies by this study team or another researcher without asking you for additional consent.

WHOM SHOULD I CONTACT IF I HAVE QUESTIONS ABOUT THE STUDY?

If you have any questions, concerns, or complaints about this study now or in the future, please contact:

Catherine Wall, (804) 828-0133, WallCS@vcu.edu

Eric Benotsch, PhD., (804) 828-0133, Ebenotsch@vcu.edu

Study 3: Vignette Study Participant Information and Informed Consent (Modified)

RESEARCH PARTICIPANT INFORMATION SHEET

STUDY TITLE: Rapid diagnosis and patient perception using a standardized patient vignette

VCU INVESTIGATOR: Catherine Wall

Eric Benotsch, PhD.

You are invited to participate in a research study. Your participation is voluntary. You may decide not to participate in this study. If you do participate, you may withdraw from the study at any time. Your decision not to take part or to withdraw will involve no penalty or loss of benefits to which you are otherwise entitled. **It is important that you carefully think about whether being in this study is right for you.**

Why is this study being done?

In this study, we are exploring how medical students perceive and respond to patient complaints when provided a short period of time in which to grasp the circumstances.

You are being asked to participate in this study because we are interested in how you and people like you respond to this situation given the time constraints.

What will happen if I participate in this study?

In this study, you will be asked to take an online survey through Qualtrics. In this survey, you will be provided a short period of time during which you will be asked to read a clinical vignette, provide a potential diagnosis, and identify some causes that may have contributed to that

diagnosis. In addition to the clinical vignette, you will be provided with information about the patient including a brief medical history and a somewhat blurred image. You will also be asked additional questions designed to assess your opinions about the situation, and you will be asked to answer some questions about related opinions and provide some demographic information. The survey should take no more than 10 minutes to complete.

What are the risks and benefits of participating?

There are both risks and benefits of participating in research studies. Some of the questions that you may be asked in this study may make you uncomfortable. You do not have to answer any questions you do not want to answer, and you may choose to stop taking the survey at any time. Participation in research might involve some loss of privacy, though NO unique identifiers (Name, ID number, Birthdate, Social Security Number, etc.) will be collected from you. The information that you report in the online survey could be used for research studies without additional informed consent.

You may not get any direct benefit from this study, but the information we learn from people in this study may help us in learning about factors that might influence diagnoses and health outcomes. It is possible that you will find some of the information to be useful.

WILL I BE PAID TO PARTICIPATE IN THE STUDY?

As a thank you for your participation, you will be provided with one $5 Amazon gift card. Additionally, you will be provided the opportunity to select one charity that that will be donated to by the researchers on your behalf.

HOW WILL INFORMATION ABOUT ME BE PROTECTED?

VCU has established secure research databases and computer systems to store information and to help with monitoring and oversight of research. The information you report in the survey may be kept in these databases but are only accessible to individuals working on this study or authorized individuals who have access for specific research related tasks.

Identifiable information in these databases are not released outside VCU unless stated in this consent or required by law. Although results of this research may be presented at meetings or in publications, identifiable personal information about participants will not be disclosed. In the future, identifiers might be removed from the information s you provide in this study, and after that removal, the information could be used for other research studies by this study team or another researcher without asking you for additional consent.

WHOM SHOULD I CONTACT IF I HAVE QUESTIONS ABOUT THE STUDY?

If you have any questions, concerns, or complaints about this study now or in the future, please contact:

Catherine Wall, (804) 828-0133, WallCS@vcu.edu

Eric Benotsch, PhD., (804) 828-0133, Ebenotsch@vcu.edu

Study 3: Vignette study debriefing document

Debriefing script

Thank you for your participation in this study. Now that the study has been completed, we would like to take a moment to discuss the purpose of this study. At the beginning of this study, we informed you that we were exploring how students who would go on to careers involving diagnosis perceive and respond to patient complaints when provided a short period of time in which to grasp the circumstances. While this information was accurate, it was incomplete. In addition to this aim, we are exploring how visual perception and stereotypes about particular minoritized populations might inform patient perception and diagnostic processes. Additionally, during the clinical vignette, we contextualized the case study with a patient image, medical history, vitals, and focused physical examination. We indicated that this context was in-line with the case study. While the clinical vignette was drawn from a true cases study in the existent literature (https://www.sciencedirect.com/science/article/pii/S1067251617303605?casa_token=yHwqopI4SJwAAAAA:jXdQpQLz9qgeFi11PVHZbRXqCy5Qp-_W5Jz_i8umKqeOtyLevqrq-90EfqoWbc2rq3_wIGakKw), the additional information that was provided was designed for the current study.

We believe that this study is important because it allows us to better understand some of the perceptual and social factors that may influence diagnostic processes and decision making. While medical decisions are often based in an understanding of biological processes, previous work has suggested that social and perceptual factors might influence diagnosis and patient perception.

All of the information is collected as a part of this study will be kept in complete confidentiality and there will be no way of connecting your responses to your identity. We are not interested in any one participant's responses by themselves. Rather, we are interested in the general responses of all participants when they are combined together.

Again, your participation in this study is greatly appreciated and will help us in furthering our understanding of how social and perceptual factors may influence diagnostic processes and patient perception. As this is an ongoing study, we ask that you not share this information with others until the study has completed data collection. We expect data collection to be completed no later than August, 2023.

Although you have already completed the study, your involvement is still voluntary, and you may choose to withdraw the data you provided prior to debriefing without penalty. Withdrawing your submission will not adversely affect your relationship with the researchers or any of our affiliates.

Do you wish to withdraw your data?

0 = No
1 = Yes

Appendix B: Study Materials

Study 1a: CI Generation Phase

Attitudes Towards Transgender Women (Billard, 2018)	
The following statements concern transgender women. The term "transgender woman" is used to describe people who were identified as male at the time of their birth but who currently live their daily lives as women. Be sure to read the prompts carefully and to answer honestly. Please rate your agreement with the following statements on a scale from 0 (strongly disagree) to 100 (strongly agree).	
1. Transgender women will never really be women.	0 = Strongly Disagree 100 = Strongly Agree
2. Transgender women are only able to look like women, but not be women	0 = Strongly Disagree 100 = Strongly Agree
3. Transgender women are not really women.	0 = Strongly Disagree 100 = Strongly Agree
4. Transgender women are trying to be someone they're not.	0 = Strongly Disagree 100 = Strongly Agree
5. Transgender women are unnatural	0 = Strongly Disagree 100 = Strongly Agree
6. Transgender women don't really understand what it means to be a woman	0 = Strongly Disagree 100 = Strongly Agree
7. Transgender women cannot just "identify" as women	0 = Strongly Disagree 100 = Strongly Agree
8. Transgender women are unable to accept who they really are	0 = Strongly Disagree 100 = Strongly Agree
9. Transgender women only think they are women	0 = Strongly Disagree 100 = Strongly Agree
10. Transgender women are defying nature	0 = Strongly Disagree 100 = Strongly Agree
11. Transgender women are denying their DNA	0 = Strongly Disagree 100 = Strongly Agree
12. There is something unique about being a woman that transgender women can never experience	0 = Strongly Disagree 100 = Strongly Agree

Reverse Correlation Task (Dotsch & Todorov, 2012)

Demographics	
Age	____Years
Gender	(Free response)
What is your work status? (Select all that apply)	1 = Employed full or part time 2 = Not employed but looking for work 3 = Not employed but not looking for work 4 = Student 5 = Disabled 6 = Retired
Which race best describes you? (Select all that apply)	1 = White or Caucasian 2 = Black or African-American 3 = Asian 4 = Middle Eastern 5 = American Indian or Alaskan Native 6 = Native Hawaiian or Other Pacific Islander
Do you consider yourself Hispanic/Latino?	1 = Yes 0 = No

Where on the following political orientation scale would you place yourself (overall, in general)?	0 = Extremely Liberal 100 = Extremely Conservative
In terms of social and cultural issues in particular, how liberal or conservative are you?	0 = Extremely Liberal 100 = Extremely Conservative
In terms of economic issues in particular, how liberal or conservative are you?	0 = Extremely Liberal 100 = Extremely Conservative
What is your sexual orientation?	(Free response)
Some individuals have a gender identity that is different from the one they were assigned at birth. These individuals are often referred to as being transgender. Are you transgender?	1 = Yes 0 = No
What is your year in school?	1 = Freshman 2 = Sophomore 3 = Junior 4 = Senior 5 = Non-degree seeking student
What is your GPA?	_____
Do you have any feedback for the study task?	_____

Study 1b: CI Rating Phase

Face rating task
In this task, we about your perceptions of each of the following faces. Please note, there is no "wrong" answer, and that your initial feelings about each face are probably the best ones.

1. How masculine is this face?	0 = Not masculine at all 100 = Very masculine
2. How feminine is this face?	0 = Not feminine at all 100 = Very feminine
3. How trustworthy does this person appear?	0 = Not trustworthy at all 100 = Very trustworthy
4. How physically healthy does this person appear to be?	0 = Not healthy at all 100 = Very healthy
5. How uncomfortable does it make you to view this person?	0 = Not uncomfortable at all 100 = Very uncomfortable

Face rating task, cisgender transgender classification
We have randomly selected one of the faces that you just saw. This is a woman's face. Some individuals have a gender identity that is different from the one they were assigned at birth. These individuals are often referred to as being transgender. Please note, there is no "wrong" answer, and that your initial feelings about each face are probably the best ones.

1. Is this woman transgender?	0 = No 100 = Yes

Demographics	
Age	____Years
Gender	(Free response)
What is your work status? (Select all that apply)	1 = Employed full or part time 2 = Not employed but looking for work 3 = Not employed but not looking for work 4 = Student 5 = Disabled
Which race best describes you? (Select all that apply)	1 = White or Caucasian 2 = Black or African-American 3 = Asian 4 = Middle Eastern 5 = American Indian or Alaskan Native
Do you consider yourself Hispanic/Latino?	1 = Yes 0 = No
Where on the following political orientation scale would you place yourself (overall, in general)?	0 = Extremely Liberal 100 = Extremely Conservative

In terms of social and cultural issues in particular, how liberal or conservative are you?	0 = Extremely Liberal 100 = Extremely Conservative
In terms of economic issues in particular, how liberal or conservative are you?	0 = Extremely Liberal 100 = Extremely Conservative
What is your sexual orientation?	(Free response)
Are you transgender?	1 = Yes 0 = No
What is your occupation?	_____
What is your average household income?	_____
Do you have any feedback for the study task?	_____

Study 2: Stimuli development and validation through use of a Point of Subjective Equality Framework

In this task, we will be asking you about your perception of several faces. These faces have been created using a face morphing program, and may look more like a man, more like a woman, or somewhere in between. You may see the same face more than once, and many of these faces may look very similar to one another. When you see each face, you will be asked to categorize the face as cisgender or transgender, A cisgender face is one that appears to be the same gender as the person was assigned at birth, while a transgender face would be one that appears to be a different gender as a person was assigned at birth. So, for example: A **cisgender** woman would be a person who was originally identified as **female** at birth and still identifies as a **woman**, while a **transgender** woman would be a person who was originally identified as **male** at birth, and now identifies as a **woman**. A **cisgender** man would be a person who was originally identified as **male** at birth and still identifies as a **man**, while a **transgender** man would be a person who was originally identified as **female** at birth, and now identifies as a **man**. A **nonbinary** transgender person may have been originally identified as a **male** or a **female** at birth, and now identifies as **neither** a man nor a woman

A cisgender woman is a person who was identified as ____ at birth and now identifies as a woman	1 – A man 2 – A woman 3 – Neither a man nor a woman
A transgender woman is a person who was identified as ____ at birth and now identifies as a woman	1 – A man 2 – A woman 3 – Neither a man nor a woman
A nonbinary person may have been identified as male or female at birth, but now identifies as	1 – A man 2 – A woman 3 – Neither a man nor a woman
How masculine or feminine would you expect the following types of people to be? Transgender woman Cisgender woman Transgender man Cisgender man Nonbinary person	0-100 (0= Very masculine; 100=Very feminine)

In this task, some of these faces may be perceived as a cisgender man or a cisgender woman. These are faces that you would categorize as “cisgender.”

Some of the faces, however, may be perceived as neither a cisgender man nor a cisgender woman. These are the faces you would categorize as “transgender.”

Is this face:

Cisgender	Transgender

Attitudes towards transgender women (Billard, 2018)

The following statements concern transgender women. The term “transgender woman” is used to describe people who were identified as male at the time of their birth but who currently live their daily lives as women. Be sure to read the prompts carefully and to answer honestly.

Please rate your agreement with the following statements on a scale from 1 (strongly disagree) to 100 (strongly agree).

Strongly Disagree — Strongly Agree

0 — 100

Transgender women will never really be women

Transgender women are only able to look like women, but not be women

Transgender women are not really women

Transgender women are trying to be someone they're not

Transgender women are unnatural

Transgender women don't really understand what it means to be a woman

Transgender women cannot just "identify" as women

Transgender women are unable to accept who they really are

Transgender women only think they are women

Transgender women are defying nature

Transgender women are denying their DNA

There is something unique about being a woman that transgender women can never experience

Demographics	
Age	____Years
Gender	(Free response)
What is your work status? (Select all that apply)	1 = Employed full or part time 2 = Not employed but looking for work 3 = Not employed but not looking for work 4 = Student 5 = Disabled
Which race best describes you? (Select all that apply)	1 = White or Caucasian 2 = Black or African-American 3 = Asian 4 = Middle Eastern 5 = American Indian or Alaskan Native 6 = Native Hawaiian or Other Pacific Islander
What color is the sky	1 = Blue 2 = Brown 3 = Green
Where on the following political orientation scale would you place yourself (overall, in general)?	0 = Extremely Liberal 100 = Extremely Conservative
In terms of social and cultural issues in particular, how liberal or conservative are you?	0 = Extremely Liberal 100 = Extremely Conservative

In terms of economic issues in particular, how liberal or conservative are you?	0 = Extremely Liberal 100 = Extremely Conservative
What is your sexual orientation?	(Free response)
Some individuals have a gender identity that is different from the one they were assigned at birth. These individuals are often referred to as being transgender. Are you transgender?	1 = Yes 0 = No
What is your average household income?	_____
Do you have any feedback for the study task?	_____

Study 3: Clinical Vignette

Instructions	
Thank you for your willingness to participate in this study. Before beginning, please answer the following questions to confirm your eligibility	
Before you begin, please read the following: We care about the quality of our survey data, and for us to get the most accurate measures of your opinions, it is important that you thoughtfully provide the best answers to each	0 = No 1 = Yes
Are you currently a student at a medical school?	0 = No 1 = Yes
What year are you in medical school?	1 = First year 2 = Second year
Have you reached your clinical rotations?	0 = No 1 = Yes

Instructions
You are now about to read a standardized clinical vignette. This vignette is based on a real scenario. You will be provided with information about the acute complaint, a copy of the patient's vitals and a brief medical history, and a picture of the patient that has been slightly blurred in order to preserve her privacy. You will have a total of four minutes to read the vignette and medical history and answer three questions that will relate to the vignette. A count-down clock will be shown at the bottom of the next page and will begin as soon as the page has loaded.
Standardized patient vignette

You are evaluating a 26 year-old patient complaining of acute left ankle and foot pain onset 3 days ago. The patient reports that the pain began immediately after a fall from an indoor rock-climbing wall 3 days ago. She has noticed progressively worsening pain and swelling in the foot and ankle since the injury which are worse with ambulating and have prevented her from working as a bartender. The patient rates the pain severity at 5/10 when at rest and 9/10 when ambulating. The pain has not improved significantly with over-the-counter pain medications including acetaminophen and ibuprofen. She says the pain is worse on the top and outside of the foot and ankle. During intake, she informed the nurse that she only recently began rock climbing. The patient denies any previous injuries in the past month or other recent physical activity. Attached below is a focused physical exam performed by you, the patient's medical and surgical history, vital signs, and medications.
Vitals/Physical Exam/History/Medications (Cisgender Condition)

Vitals
Height: 67”
Weight:180 lbs.
BP: 126/70
HR: 68 bpm

Focused Physical Exam
Pain with passive and active range of motion of left ankle. Tenderness inferior to lateral malleolus. Induration to lateral left ankle and dorsal left foot. 2+ bilateral dorsalis pedis and posterior tibial pulses. Physical exam otherwise non-tender with normal joint range of motion.

Medical/Surgical History
Denies any prior orthopedic surgery

Current medication
2 mg Estradiol PO daily
200 mg Progesterone PO nightly

Patient Vitals and Medical History (Transgender Condition)

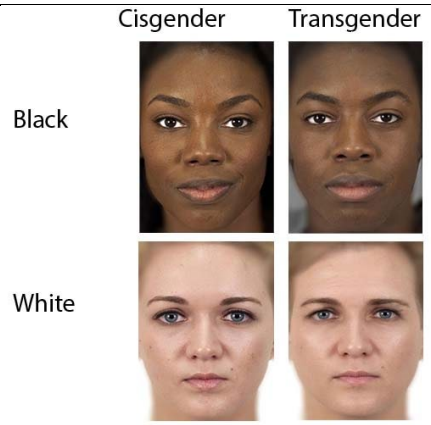
Vitals
Height: 67”
Weight:180 lbs.
BP: 126/70
HR: 68 bpm

Focused Physical Exam
Pain with passive and active range of motion of left ankle. Tenderness inferior to lateral malleolus. Induration to lateral left ankle and dorsal left foot. 2+ bilateral dorsalis pedis and posterior tibial pulses. Physical exam otherwise non-tender with normal joint range of motion.

Medical/Surgical History
Denies any prior orthopedic surgery
Gender dysphoria

Current medication
2 mg Estradiol PO Daily
100 mg Progesterone PO nightly

Patient Images by condition

	
Based on the information provided, what is your initial diagnosis?	(Free response)
Based on the information provided, what factors do you believe lead to this acute complaint?	(Free response)
Beyond the primary factors you have mentioned, are there any secondary factors you think may have contributed to this acute complaint?	(Free response)
What additional questions would you like to ask the patient before proceeding to test your initial diagnosis?	(Free response)
Thank you for answering those questions! Now we would like to ask you some of your initial opinions about the patient based on the information we have provided. Previous research has suggested that we can draw conclusions about people from very limited information. Don't try to think too hard about your answers to these questions; your first impulse is usually the best.	
How trustworthy do you think this patient is?	0 = Very untrustworthy 100 = Very trustworthy

How comfortable would you be working with this patient?	0 = Very uncomfortable 100 = Very comfortable
How willing would you be to work with this patient?	0 = Very unwilling (I would only work with this patient if forced to) 100 = Very willing (I would go out of my way to work with this patient)
How competent do you believe that you would feel working with this patient?	0 = Not competent at all 100 = Very competent

Attitudes Towards Transgender Women	
The following statements concern transgender women. The term "transgender woman" is used to describe people who were identified as male at the time of their birth but who currently live their daily lives as women. Be sure to read the prompts carefully and to answer honestly. Please rate your agreement with the following statements on a scale from 0 (strongly disagree) to 100 (strongly agree).	
1. Transgender women will never really be women.	0 = Strongly Disagree 100 = Strongly Agree
2. Transgender women are only able to look like women, but not be women	0 = Strongly Disagree 100 = Strongly Agree
3. Transgender women are not really women.	0 = Strongly Disagree 100 = Strongly Agree
4. Transgender women are trying to be someone they're not.	0 = Strongly Disagree 100 = Strongly Agree
5. Transgender women are unnatural	0 = Strongly Disagree 100 = Strongly Agree
6. Transgender women don't really understand what it means to be a woman	0 = Strongly Disagree 100 = Strongly Agree
7. Transgender women cannot just "identify" as women	0 = Strongly Disagree 100 = Strongly Agree
8. Transgender women are unable to accept who they really are	0 = Strongly Disagree 100 = Strongly Agree

9. Transgender women only think they are women	0 = Strongly Disagree 100 = Strongly Agree
10. Transgender women are defying nature	0 = Strongly Disagree 100 = Strongly Agree
11. Transgender women are denying their DNA	0 = Strongly Disagree 100 = Strongly Agree
12. There is something unique about being a woman that transgender women can never experience	0 = Strongly Disagree 100 = Strongly Agree

Demographics	
How old are you?	(Free Response)
What is your gender?	(Free response)
When we describe who participated in our study, which of these categories would you like us to include you in?	1 = A trans/transgender category (usually refers to people who were given a gender and/or sex label at birth that does not accurately represent them) 2 = A cisgender category (refers to people who are the same gender and/or sex they were assigned at birth 3 = Neither cisgender nor transgender describe me because _____ 4 = Unsure because_____
And which of these categories would you like us to include you in?	1 = Binary (someone who identifies as exclusively a man/male or woman/female) 2 = Nonbinary (someone who has an identity other than exclusively woman/female or man/male) 3 = Neither binary nor nonbinary describe me because _____ 4 = Unsure because_____
What is your sexual orientation?	(Free response)

Which race best describes you? (Select all that apply)	1 = American Indian or Alaskan Native 2 = Asian 3 = Black or African-American 4 = Hispanic/Latino/Latinx 5 = Middle Eastern 6 = Native Hawaiian or Other Pacific Islander 7 = White or Caucasian 8 = Other (please specify):__
Where on the following political orientation scale would you place yourself (overall, in general)?	0 = Political Left 100 = Political Right
In terms of social and cultural issues in particular, where do you place yourself?	0 = Political Left 100 = Political Right
In terms of economic issues in particular, where do you place yourself?	0 = Political Left 100 = Political Right
What is your average household income?	(Numeric response)
Where are you attending school?	(Free response)
How many years have you been in your program?	(Numeric response)
How many hours of coursework have you had that focused on transgender health?	(Numeric response)
What kind of coursework have you had that focused on transgender health?	(Free response)
In the course of your clinical work, have you worked with a transgender individual?	0 = No 1 = Yes
How positive or negative have your experiences working with transgender individuals been?	0 = Very negative 100 = Very positive
Do you have any feedback for the study task?	_____

Study 3: Clinical Vignette – Coding Instructions

I want to start off by saying thank you so much for being willing to code responses for this project. This project is very important to me, and, hopefully, something interesting will come of it!

For this project, you will be coding for four separate constructs across four variables. There will be 103 participants worth of data that you will be coding. The four variables you will be coding are based on a specific scenario that the participants have been provided, and they are labeled as follows:

1. **Primary Factors**: Based on the information provided, what factors do you believe lead to this acute complaint?
2. **Secondary Factors**: Beyond the primary factors you have mentioned, are there any secondary factors you think may have contributed to this acute complaint?
3. **Reasoning:** Why do you think these factors contributed to the acute complaint?
4. **Questions:** What additional questions would you like to ask the patient before proceeding to test your initial diagnosis?

Your goal is to examine all four of these variables and to identify the presence (or lack thereof) of each of the following constructs:

1. Gender-Related Medical Misattribution: Does the participant suggest that the acute injury is related to hormone replacement therapy (HRT) or the patient's gender identity? HRT, in this case, might be a mention of estradiol/estrogen, progesterone, "hormones," or "medication." In some cases, participants might mention blood clots or DVT, or they may even mention "bone density" (while not referring to obesity).

This category is coded using a 0-2 scale (0 = Perceived causal factors definitely unrelated to gender identity/HRT, 1 = Perceived causal factors possibly related to gender identity/HRT, 2 = Perceived causal factors definitely related to gender identity/HRT). An example of something that is "possible related to gender identity/HRT" would be if a participant noted bone density but did not specify HRT.

2. Invasive Questioning: Does this participant ask questions related to HRT? (1 = Questions about HRT regimen, 0 = No questions about HRT regimen)?
3. Obesity_BMI: Does this participant mention BMI, obesity, or weight? (1 = Mentions obesity or BMI, 0 = Doesn't mention obesity or BMI)
4. Gender_Identity: Does this participant mention gender identity? This may take the form of mentioning the word "transgender" or it may take the form of mention of assigned sex at birth. (1 = Gender identity was brought up, 0 = Gender identity was not brought up)

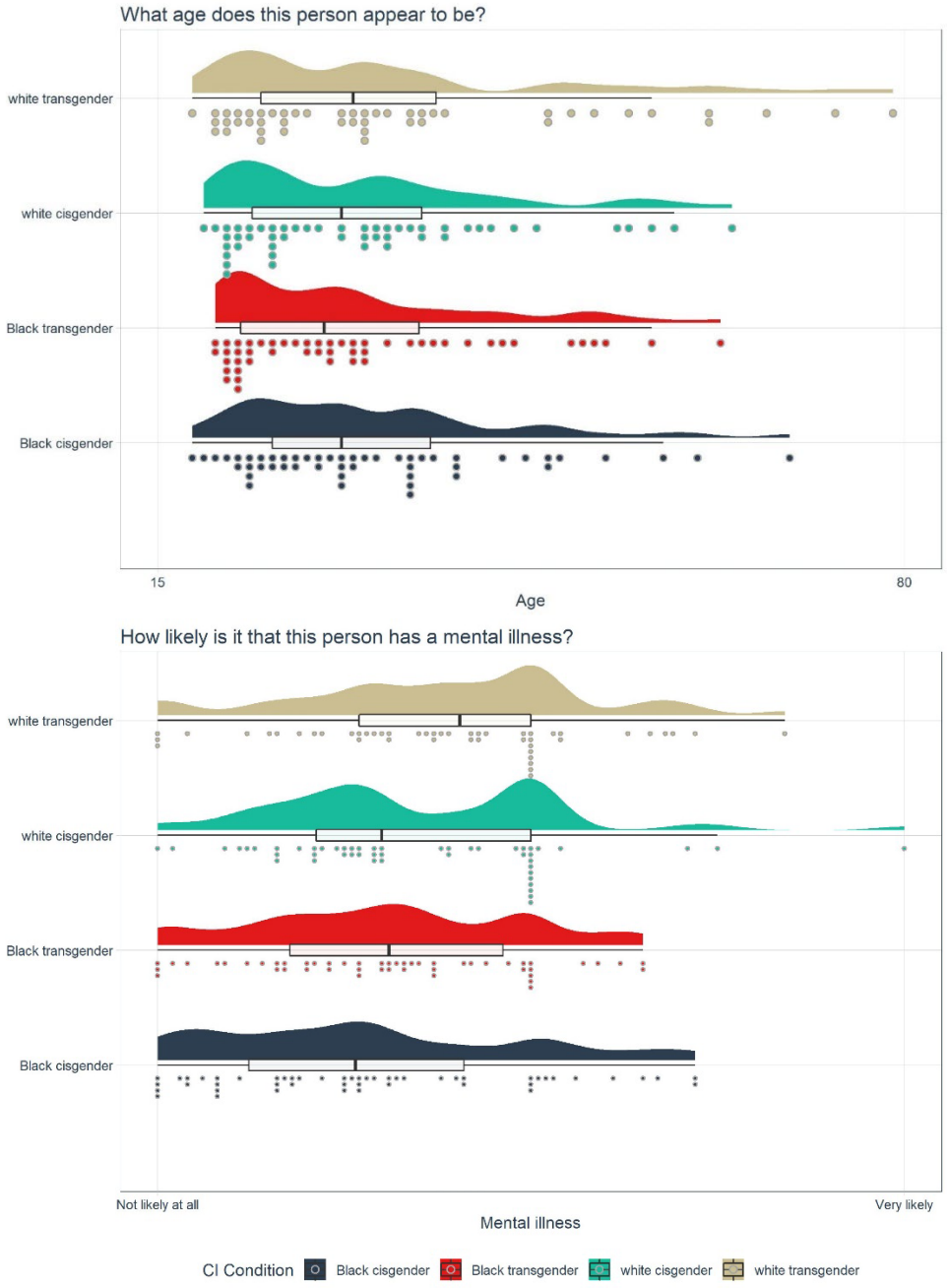
Important things to note!

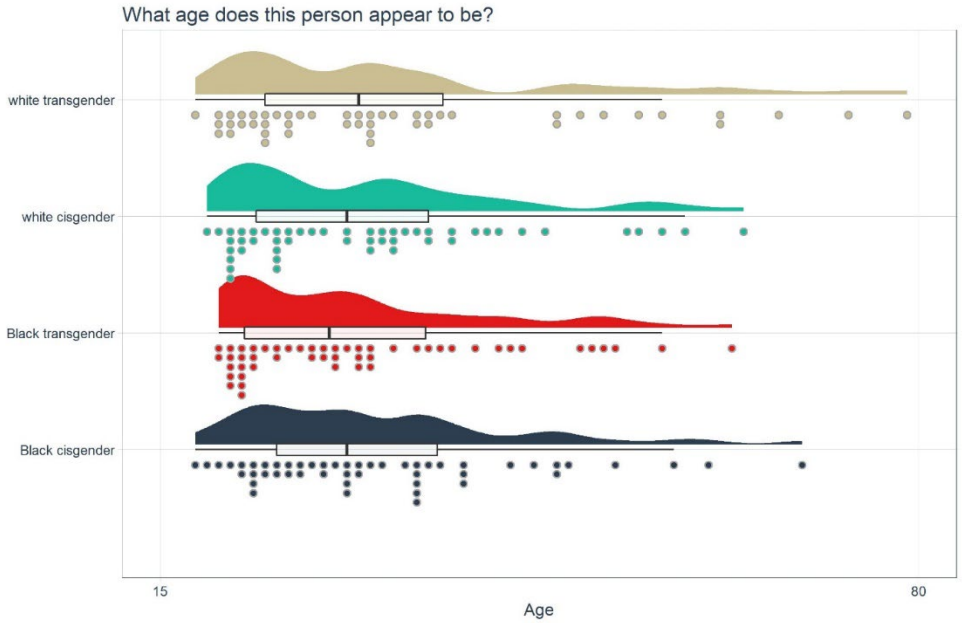
These participants are students pursing higher education, and are in programs where they are learning incredibly specific language to talk about human bodies and injuries. In some cases, this might lead to participants using words or acronyms that you don't know. In these cases, Google is your best friend. A combination of the acronym/phrase and "medicine" or, in some cases, "HRT" will provide you with more information about the participant's intentions.

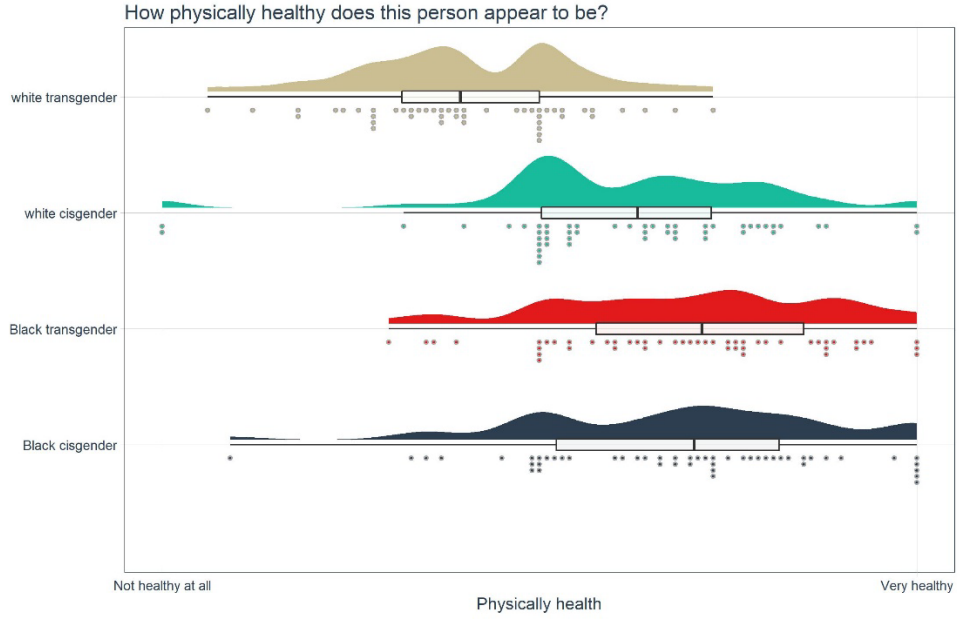
If you run into issues, please contact me via email!

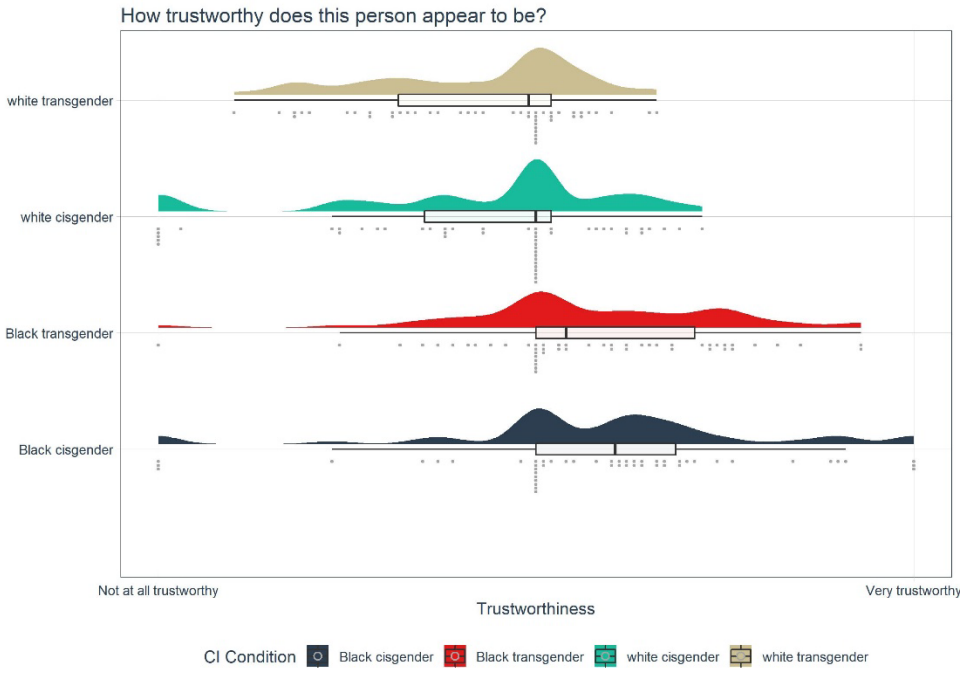
Appendix C

Additional graphs from Study 1b

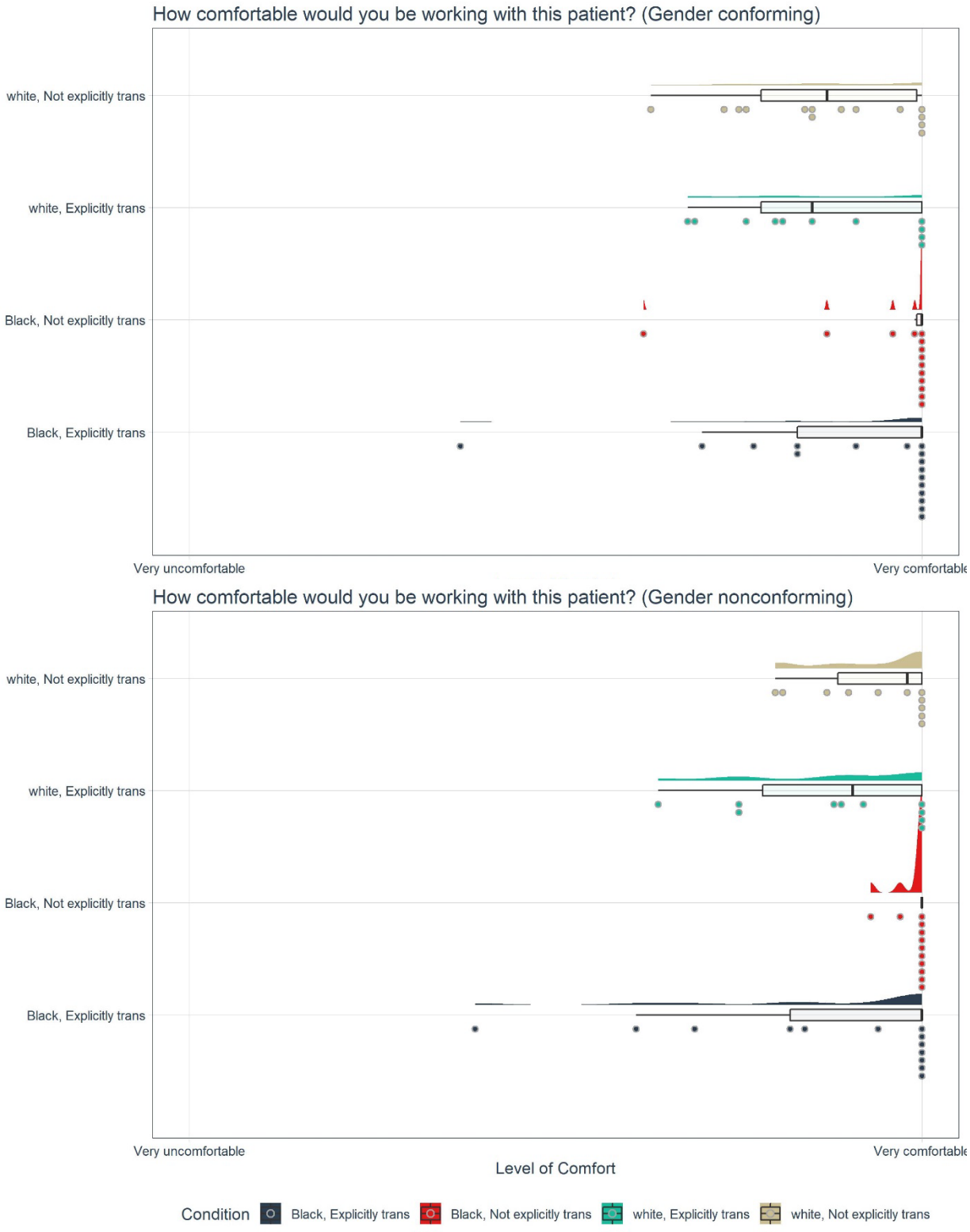


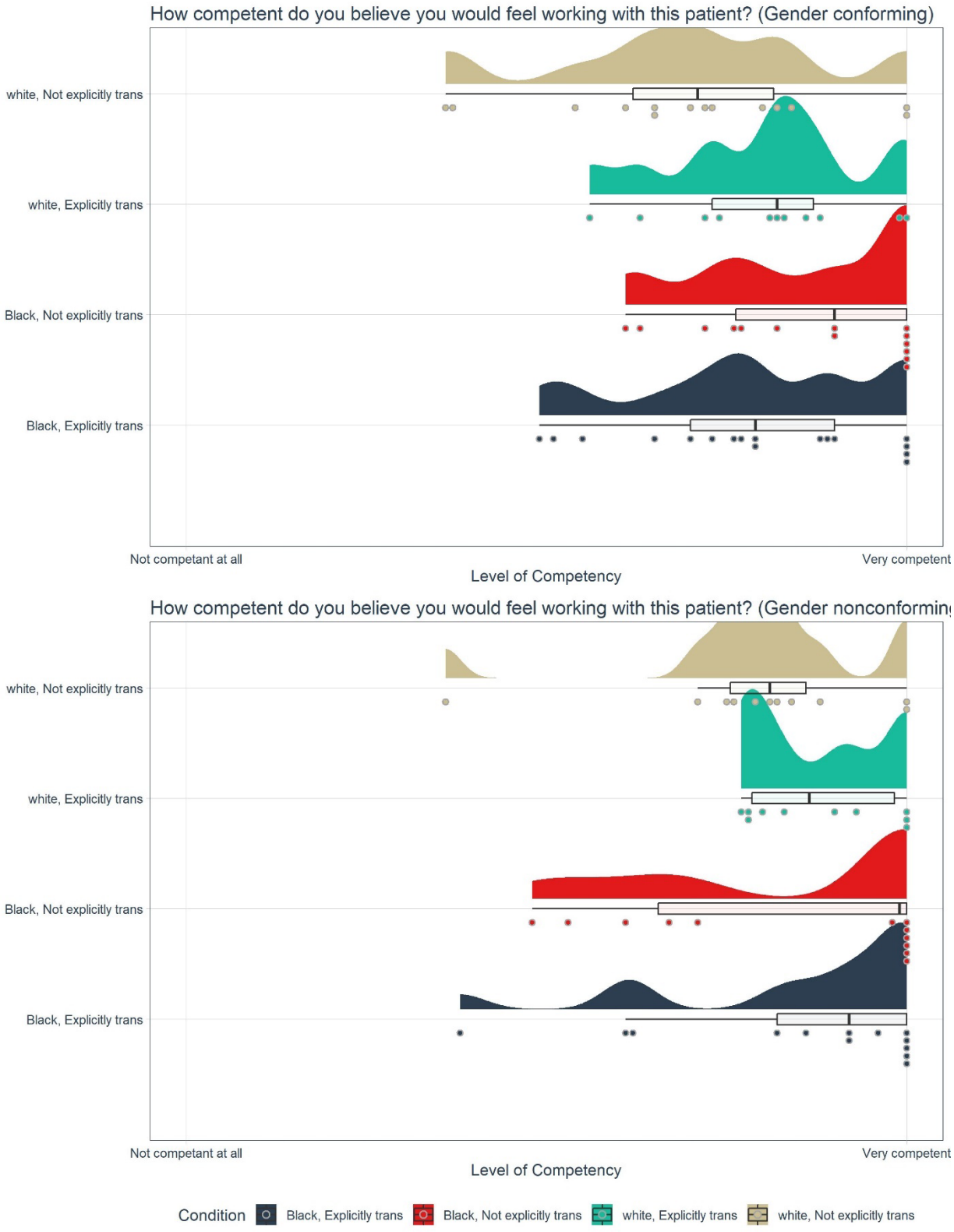

What age does this person appear to be?
white transgender
white cisgender
Black transgender
Black cisgender
15
80
Age

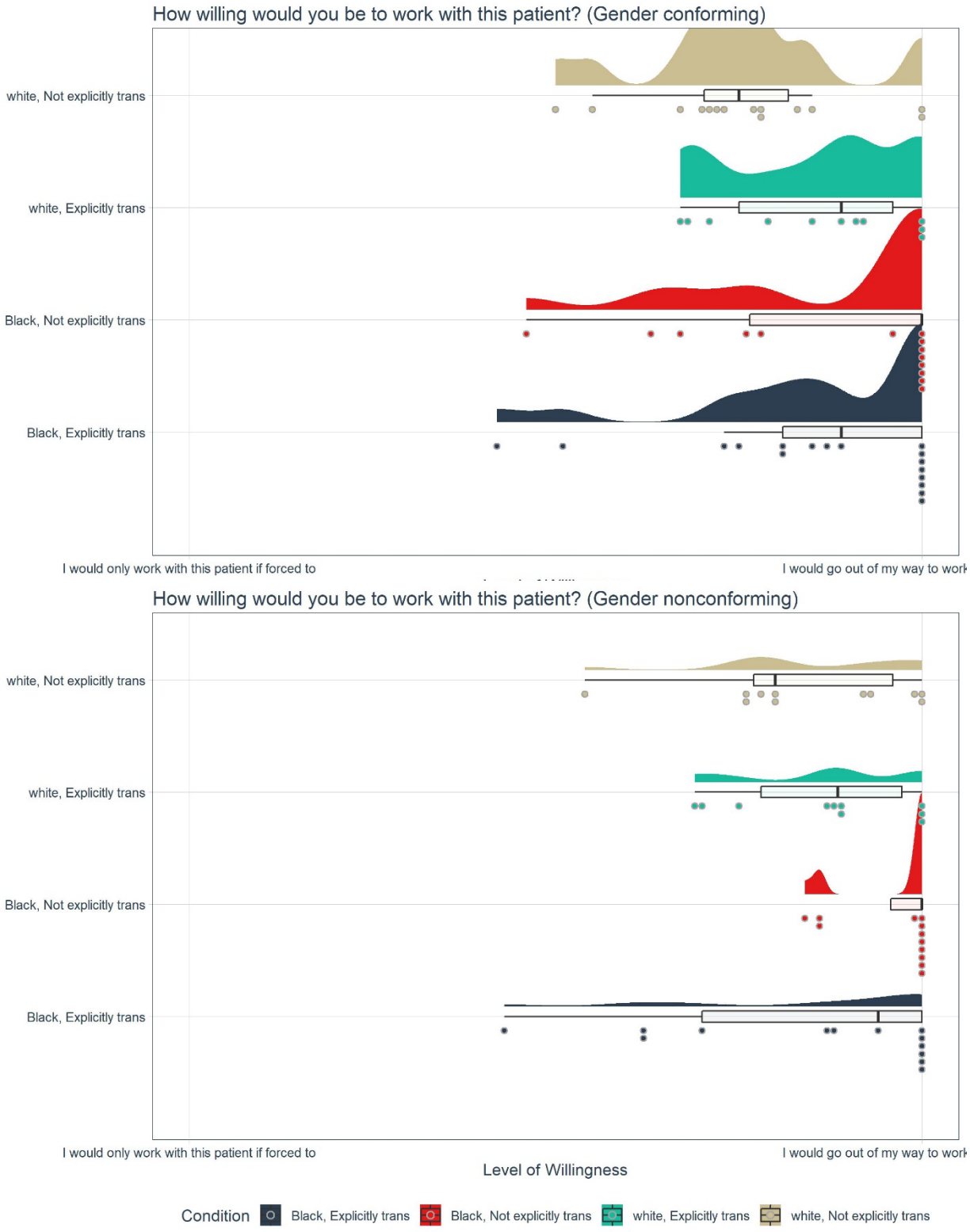

How physically healthy does this person appear to be?
white transgender
white cisgender
Black transgender
Black cisgender
Not healthy at all
Very healthy
Physically health


How trustworthy does this person appear to be?
white transgender
white cisgender
Black transgender
Black cisgender
Not at all trustworthy
Very trustworthy
Trustworthiness
CI Condition
Black cisgender
Black transgender
white cisgender
white transgender

Additional graphs from Study 3




How competent do you believe you would feel working with this patient? (Gender conforming)
white, Not explicitly trans
white, Explicitly trans
Black, Not explicitly trans
Black, Explicitly trans
Not competant at all
Very competent
Level of Competency
How competent do you believe you would feel working with this patient? (Gender nonconforming
white, Not explicitly trans
white, Explicitly trans
Black, Not explicitly trans
Black, Explicitly trans
Not competant at all
Very competent
Level of Competency
Condition
Black, Explicitly trans
Black, Not explicitly trans
white, Explicitly trans
white, Not explicitly trans


How willing would you be to work with this patient? (Gender conforming)
white, Not explicitly trans
white, Explicitly trans
Black, Not explicitly trans
Black, Explicitly trans
I would only work with this patient if forced to
I would go out of my way to work
How willing would you be to work with this patient? (Gender nonconforming)
white, Not explicitly trans
white, Explicitly trans
Black, Not explicitly trans
Black, Explicitly trans
I would only work with this patient if forced to
I would go out of my way to work
Level of Willingness
Condition
Black, Explicitly trans
Black, Not explicitly trans
white, Explicitly trans
white, Not explicitly trans